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FOREWORD

The *United States Armed Forces Medical Journal* is the medium for disseminating information of administrative and professional interest to all medical personnel of the Department of Defense. The Chairman of the Armed Forces Medical Policy Council and the Surgeons General of the several services invite all medical officers, dental officers, Medical Service Corps officers, Nurse Corps officers, and officers of the Veterinary Corps of the Armed Forces, and the medical consultants of the Army, Navy, and Air Force to submit manuscripts for publication in this *Journal.*

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Table of Contents

Page

The Armed Forces Medical Policy Council: II. Planning Coordination Division 467

The Surgical Management of Bronchiectasis: A Review Based on the Analysis of 100 Consecutive Resections—*Clifford F. Storey* and *Eugene G. Laforet* 469

Psychotherapy With Combat Fliers—*Robert J. Lifton* 525

Painless Myocardial Infarction—*Fred B. Rogers* 533

The Bacteriologic Diagnosis of Enteric Infections—*Albert V. Hardy, Richard P. Mason, David Hamerick, and Roland B. Mitchell* 541

Page

Articles by Personnel of the Medical Services of the Armed Forces Published in Other Journals 554

Elective Induction of Labor Using Oxytocin Injection Intravenously—*Paul M. Gold* and *John H. Angell* 555

Rates of Wound Healing When Standard and Experimental Burn Dressings Were Used—*Daniel S. J. Choy* 559

The Use and Misuse of Dermatologic Preparations—*William R. Walsh* 563

Self-Curing Acrylic Resin Crowns and Inlays—*Seymour M. London* 571

Treatment of Rhus Dermatitis: Ineffectiveness of Cortisone—*Robert J. Hoagland* 581

Epidemiology of Leprosy in American Samoa—*John A. C. Gray* 585

Roentgenographic Signs of Intestinal Parasitic Infestation: A Case Report—*Lewis E. Etter* and *Lawrence C. Cross* 599

Extensive Rupture of Spleen With Delayed Signs of Hemorrhage—*Charles Atamian, John McFarlane,* and *Henry S. Blake* 603

Delayed Rupture of the Spleen: A Case Report—*Paul J. Kowallek, Jr.* 605

Treatment of Exfoliative Dermatitis With Cortisone—*Donald M. Koppel* .. 607

The Itinerant Dependent and Medical Records—*Hermann J. Lukeman* 611

The Ocular-Mucous Membrane Syndrome—*J. J. Falsone, Edward H. Ferguson,* and *Henry B. Wilson* 613

Plastic Bag for Shipping Tissue Specimens—*Arthur Steer* 617

Regular Army Appointments in the Medical Service Corps—*Robert L. Black* 621

An Accounting—*Spurgeon H. Neel, Jr.* 625

Aero Medical Association: Medical Officers to Speak at Los Angeles Meeting, 11-13 May 1953 629

Shadow of the Antral Portion of the Stomach Simulating a Soft Tissue Tumefaction—*Paul A. Paden* and *Harrison Shapiro* 631

BOOKS RECEIVED 468
523, 524, 532, 539, 540, 580

BOOK REVIEWS 557
558, 561, 562, 569, 570, 598, 602, 606, 610, 616, 619, 620, 623, 624, 628, 633

Monthly Message

One cannot help viewing with apprehension the present status of career incentive throughout the rank and file of the Armed Forces. Numerous articles within recent months have pointed out inherent dangers of this negative trend to the long-range security of our national defense. One of the newspapers of our Nation's capital dated, perhaps significantly, on Washington's birthday, headlined a news item, "Seventy-five Percent Drop in Re-Enlistments Alarms Army and Congress," and then added that "even the 'Hard Core' of the Service is affected." A military professional journal under about the same dateline placed its editorial finger on the basic cause as "the progressive deterioration in the attractiveness of the Armed Services as a career." When one adds to this already difficult morale situation the necessity for a discriminatory "doctor draft" law, it is not surprising that reserve medical, dental, and veterinary officers show little interest in a career in uniform.

Appreciating the seriousness of this situation, members of the Armed Forces Medical Policy Council have made every effort, both at home and overseas, to discuss this problem with doctors in uniform in an effort to determine and, if possible, correct inequities contributing to a depreciation in career incentive. Wherever possible the Council has taken positive action and will continue unceasingly in this important effort.

Only a small minority of the "grass roots" informants discussing career interests complain of the lack of professional challenge in the service. Most of those with whom this subject was discussed were deeply grateful for the opportunity for professional advancement made available in military hospitals and research centers. One of the most constant and serious criticisms heard is that of the uncertainty of a future in uniform. In view of the gradual but none-the-less certain deprivation of the rights and privileges of service personnel, one is hard put to dispel this atmosphere of future uncertainty.

We as a nation cannot afford to forget that the stabilization of a "hard core" of career doctors in the Armed Forces is essential to our security and every effort both within and without the Department of Defense must be made to improve the present seriously low status of career incentive.

Melvin A. Casberg, M. D., *Chairman*
Armed Forces Medical Policy Council
Office of the Secretary of Defense

THE ARMED FORCES MEDICAL POLICY COUNCIL

II. Planning Coordination Division (1)

THE Planning Coordination Division (fig. 1) develops, coordinates, and recommends long-range Department of Defense plans and related policies in the medical and health fields coming under the jurisdiction of the Armed Forces Medical Policy Council. To accomplish these responsibilities, working relationships with other divisions and with appropriate agencies, both inside and outside the Department of Defense, are maintained.

Figure 1. Planning Coordination Division, Armed Forces Medical Policy Council. Left to right: Colonel Thair C. Rich, MC, USA, Staff Assistant; Brigadier General Harold H. Twitchell, USAF (MC), Chief of Division; and Captain William L. Engelman, MC, USN, Staff Assistant.

The medical portion of the Department of Defense Public Works Program, which includes annual, long-range, and mobilization plans, is a primary project of this Division. Although the responsibility for planning and supervision of the Department of Defense Public Works Program is vested in the newly established office of the Director of Installations, Office of the Secretary of Defense, the Planning Coordination Division serves as advisors to this agency on all medical projects.

(1) The second of four articles on the Armed Forces Medical Policy Council.

A major contribution of the Division, in collaboration with a task group sponsored by the Munitions Board, Office of the Secretary of Defense, has been the development of uniform basic construction plans for military hospitals, to be used by the Army, Navy, and Air Force. The designs are for both temporary and permanent construction. All sizes and types of hospitals have incorporated into their initial chassis basic facilities which will permit a 100 percent expansion in bed capacity by the construction of additional wards only.

Close liaison is maintained by the Division with the Central Intelligence Agency and with the medical officers assigned to the intelligence services of the Army, Navy, and Air Force, coordinating such activities as may be required by the Council.

This Division maintains continuing liaison and coordination on matters relating to the medical and health fields with the Joint Chiefs of Staff, the Munitions Board, and other Department of Defense agencies. In this category are policy problems relating to mobilization reserves of medical materiel, the Armed Services Medical Procurement Agency, and the Armed Services Medical Regulating Office.

BOOKS RECEIVED

Fundamentals of Clinical Orthopedics, by *Peter A. Casagrande*, M. D., Orthopedic Department of Buffalo General Hospital, Buffalo Children's Hospital, and the University of Buffalo Medical School; Attending Orthopedist at the Chronic Disease Research Institute of the University of Buffalo, and the Veterans Administration Hospital, Buffalo, N. Y., and *Harold M. Frost*, Jr., M. D., Orthopedic Department of Buffalo General Hospital and The University of Buffalo Medical School, Buffalo, N. Y. Forewords by *Joseph S. Barr*, M. D., and *Frank N. Potts*, M. D. 582 pages; illustrated. Grune & Stratton, Inc., N. Y., publishers, 1953. Price $18.50.

The Basis of Clinical Neurology, The Anatomy and Physiology of the Nervous System in Their Application to Clinical Neurology, by *Samuel Brock*, M. D., Professor of Neurology, College of Medicine, New York University. 3d edition. 510 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., publishers, 1953. Price $7.

Diseases of the Heart and Arteries, Anatomical and Functional Disturbances of the Circulation; Treatment, by *George R. Herrmann*, M. S., M. D., Ph. D., F. A. C. P., Professor of Medicine, University of Texas; Director of the Cardiovascular Service and Heart Station, University Hospitals; Consultant in Vascular Diseases, United States Marine Hospital; Consultant in Medicine to Surgeon General, United States Army. 4th edition. 652 pages; illustrated. The C. V. Mosby Co., St. Louis, Mo., publishers, 1952. Price $12.50.

THE SURGICAL MANAGEMENT OF BRONCHIECTASIS[1]

A Review Based on the Analysis of 100 Consecutive Resections

CLIFFORD F. STOREY, *Captain, MC, USN*

EUGENE G. LAFORET, *Lieutenant, MC, USNR*

BRONCHIECTASIS is second in frequency only to pulmonary tuberculosis among the chronic pulmonary diseases. The fact that it is commonly encountered in otherwise healthy young adults makes it a condition of great economic and military importance. The excellent therapeutic results that can be achieved by surgery emphasize the need for an accurate diagnosis and adequate treatment. Bronchiectasis can be cured only by resection of the diseased segments of lung, and a well planned and skillfully executed surgical program usually assures a satisfying clinical result. Service personnel who have undergone successful resection ordinarily can be returned to active military duty.

The constantly improving postoperative results and the marked reduction in operative mortality and in morbidity following excision which have occurred within recent years account for the dominant position which surgical treatment has assumed. Refinements of diagnostic, surgical, and anesthetic technics have played prominent roles in bringing this mode of therapy to the forefront. Operative management is not yet a standardized procedure applicable to all patients, however, and differences of opinion still exist relative to such fundamental questions as the selection of patients for operation, the extent of resection, and the details of postoperative care.

HISTORICAL REVIEW

The story of the development of the modern surgical treatment of bronchiectasis provides a fascinating chapter in the history of thoracic surgery. Although the first successful partial lobectomy was performed by Rolandus *(2)* in 1499, resection of a lobe of the lung *for bronchiectasis* was not carried out with success until the operation performed by Heidenhain *(3)* in 1901. As recent-

(1) From the U. S. Naval Hospital, St. Albans, N. Y.

(2) Rolandus: Cited in Paget, S.: Surgery of the Chest. E. B. Treat & Co., New York, N. Y., 1897. p. 86.

(3) Heidenhain, L.: Ausgedehnte Lungenresektion wegen zahlreicher eiternder Bronchiektasien in einem Unterlappen. Verhandl. d. deutsch. Gesellsch. f. Chir. 30: 636, 1901.

ly as 1925 the literature contained reports of only 85 patients with bronchiectasis who were treated by resection *(4, 5)*, and the mortality rate approximated 60 percent. It was not until the late 1930's that excisional surgery for bronchiectasis became a firmly established procedure. By that time thoracic surgery had progressed to the point where Churchill *(6)*, Edwards *(7)*, and others *(8-10)* could each report a fairly large series of patients who had been treated by resection with a reasonably low mortality rate.

In the period of over 2 centuries between the original description of bronchiectasis by Laënnec *(11)* and the perfection of its surgical therapy within the past 2 decades, its treatment was characterized by almost endless vicissitudes. All medical measures which had been tried had been marked by such discouraging and disappointing results that Mosler *(12)* in 1873 suggested the drainage of bronchiectatic cavities by bronchotomy. This was attempted by a number of workers, but the operation was abandoned because of its high mortality and almost universally poor results. Mumford and Robinson *(13)* found a mortality rate of 62 percent in a series of 33 reported patients.

Sauerbruch *(14)* collected a series of 123 reported patients with bronchiectasis treated by pneumonotomy, of whom 33 percent were reported as cured, 35 percent died, and the remainder benefited little if any. Because of these unfavorable results, he advocated ligation of the pulmonary artery supplying the affected lobe, in order to produce pulmonary fibrosis. No real success was achieved by this technic and after an adequate trial the operation was abandoned. In 1914 Mumford and Robinson *(13)* advocated arti-

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(4) Dolley, F. S., and Jones, J. C.: Lobectomy and pneumonectomy for lung suppuration and malignancy; comprehensive analysis including author's series; pt. 1. Journal-Lancet 59: 162-168, Apr. 1939.

(5) Dolley, F. S., and Jones, J. C.: Lobectomy and pneumonectomy for lung suppuration and malignancy; comprehensive analysis including authors' series; pt. 2. Journal-Lancet 59: 268-278, June 1939.

(6) Churchill, E. D.: Lobectomy and pneumonectomy in bronchiectasis and cystic disease. J. Thoracic Surg. 6: 286-311, Feb. 1937.

(7) Edwards, A. T.: Modern principles of treatment in bronchiectasis based upon 199 cases treated by lobectomy or total pneumonectomy (Harveian lecture). Brit. M. J. 1: 809-815, Apr. 22, 1939.

(8) Romanis, W. H. C., and Sellors, T. H.: Lobectomy in bronchiectasis. Lancet 2: 1445-1447, Dec. 19, 1936.

(9) Sauerbruch, F.: Cited in footnote references *(4, 5)*.

(10) Nissen, R.: Cited in footnote references *(4, 5)*.

(11) Laënnec, R. T. H.: Traite de l'auscultation mediate. vol. 1. 1819. Cited in Ochsner, A.: Bronchiectasis. Am. J. M. Sc. 179: 388-405, Mar. 1930.

(12) Mosler: Cited in footnote reference *(14)*.

(13) Mumford, J. G., and Robinson, S.: Surgical aspects of bronchiectasis. Ann. Surg. 60: 29, 1914.

(14) Sauerbruch, F.: Die Bronchiektasen. Rapports et procès-verbaux de la Troisième Congrès de la Société internationale de Chirurgie, Bruxelles, 1911. p. 269. Discussion by Schumacher, p. 808.

ficial pneumothorax for those patients with bronchiectasis having a free pleural space. Whittemore and Balboni *(15)* collected reports of 93 patients so treated, of whom only 14 were reported as cured. They concluded that pneumothorax could not be considered a curative measure in bronchiectasis.

Körte *(16)* reported 3 patients with bronchiectasis treated by thoracoplasty. This operation was used for a number of years and was popularized in this country by Hedblom *(17)* who described 18 patients treated by thoracoplasty with no early deaths and marked improvement in most cases. He suggested that the thoracoplasty be performed in stages. Despite favorable early results in some cases, improvement following thoracoplasty was often temporary, and patients so treated continued to die of their disease. Plombage with paraffin, fat, and omentum were tried with disappointing results *(18)*. Phrenicectomy enjoyed a wave of popularity as a therapeutic measure between 1920 and 1930 *(19-22)*, but in 1935 Graham et al. *(23)* collected 82 cases treated by this method alone without definite beneficial results.

Occasional patients with bronchiectasis were treated by lobectomy following Heidenhain's successful operation in 1901. By 1923, Graham *(24)* was able to collect reports of 48 such patients, of whom 25 died and in only 8 of whom was the therapy considered a success. These unfavorable results caused him *(25)* to advocate cautery pneumonectomy. In 1927 he *(26)* reported 45 patients with various types of suppurative pulmonary disease in

(15) Whittemore, W., and Balboni, G. M.: Nontuberculous bronchopulmonary suppurative lesions; results of treatment by artificial pneumothorax. Arch. Surg. 16: 228-278, Jan. (pt. 2) 1928.

(16) Körte, W.: Erfahrungen über Operation wegen Lungen-eiterung und Gangrän. Arch. f. klin. chir. 85: 1-62, 1908.

(17) Hedblom, C. A.: Extrapleural thoracoplasty in treatment of bronchiectasis. Surg., Gynec. & Obst. 38: 747-752, June 1924.

(18) Meyer, W.: On bronchiectasis. Ann. Surg. 60: 7, 1914.

(19) Brauer, L.: Die Kollapstherapie der Bronchiektasen. Tung-chi, Med. Monatschr. 2: 437-449, July 1927.

(20) McGregor, A. L.: Surgery of bronchiectasis. J. M. A. S. Africa 1: 141-143, Mar. 26, 1927.

(21) Harrington, S. W.: Phrenic neurectomy for relief of bronchiectasis. Proc. Staff Meet., Mayo Clin. 3: 98, Mar. 21, 1928.

(22) Davies, H. M.: Endeavour to assess value of hemidiaphragmatic paralysis, by evulsion of phrenic nerve, in treatment of pulmonary tuberculosis and bronchiectasis; review of 105 cases. Tubercle 9: 205-216, Feb. 1928.

(23) Graham, E. A.; Singer, J. J.; and Ballon, H. C.: Surgical Diseases of the Chest. Lea & Febiger, Philadelphia, Pa., 1935.

(24) Graham, E. A.: Surgical treatment of bronchiectasis, with report of 3 cases of removal of lobe of lung. Arch. Surg. 6: 321-336, (pt. 2) Jan. 1923.

(25) Graham, E. A.: Cautery pneumonectomy for chronic suppuration of lung; report of 20 cases. Arch. Surg. 10: 392-418, (pt. 2) Jan. 1925.

(26) Graham, E. A.: Treatment of pulmonary suppuration. Trans. Am. Surg. Assn. 45: 200-209, 1927; Ann. Surg. 86: 174-181, Aug. 1927.

whom the cautery technic had been applied. The mortality in this series totaled 17.8 percent, and 69 percent of the patients were symptom-free at the time of his report.

The modern era in the surgical treatment of bronchiectasis began in 1929 when Brunn *(27)* reported 6 one-stage lobectomies with 1 death. The operation had previously been carried out in 2 or more stages *(28)*. The primary stage of the multiple stage procedure was designed to promote obliteration of the pleural space, so that total empyema would not follow the resection and so that physiologic disturbances resulting from an open chest would be minimized. Clamps or mass ligatures were applied to the hilar structures at the time of lobectomy. The tourniquet technic was introduced by Shenstone and Janes *(29)*. The first total pneumonectomy for bronchiectasis was performed by Nissen *(30)* in Germany in 1931. The second such operation, and the first in this country, was done by Haight *(31)* in 1932. Dolley and Jones *(4, 5)* collected 46 cases of bronchiectasis treated by pneumonectomy. The operative mortality was 37 percent and only 39 percent of the patients were considered cured.

The latest great advance in the surgical therapy of bronchiectasis consisted in the introduction by Churchill and Belsey *(32)* in 1932 of the technic of segmental resection. The widespread adoption of the policy of limiting the resection to those segments shown to be involved and universal employment of the individual hilar dissection and ligation technic have resulted in resection for bronchiectasis becoming one of the safest and most satisfactory of all major surgical procedures, as shown by the report of Kay et al. *(33)*, who performed resections on 184 patients with bronchiectasis, only 1 of whom died.

MEDICAL MANAGEMENT

Almost universally, internists, aware of the strict limitations of nonsurgical treatment in bronchiectasis, have been among the

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(27) Brunn, H. B.: Surgical principles underlying one-stage lobectomy. Arch. Surg. 18: 490-515, Jan. (pt. 2) 1929.

(28) Alexander, J. (Ann Arbor, Mich.): Total pulmonary lobectomy; simple and effective two-stage technique. Surg., Gynec. & Obst. 56: 658-673, Mar, 1933.

(29) Shenstone, N. S., and Janes, R. M.: Experiences in pulmonary lobectomy. Canad. M. A. J. 27: 138-145, Aug. 1932.

(30) Nissen, R.: Exstirpation eines ganzen Lungenflügels. Zentralbl. f. Chir. 58: 3003-3006, Nov. 21, 1931.

(31) Haight, C.: Total removal of left lung for bronchiectasis. Surg., Gynec. & Obst. 58: 768-780, Apr. 1934.

(32) Churchill, E. D., and Belsey, R.: Segmental pneumonectomy in bronchiectasis; lingula segment of left upper lobe. Ann. Surg. 109: 481-499, Apr. 1939.

(33) Kay, E. B.; Meade, R. H., Jr.; and Hughes, F. A., Jr.: Surgical treatment of bronchiectasis. Ann. Int. Med. 26: 1-12, Jan. 1947.

most ardent proponents of resection *(34-36)*. Robinson *(37)* stated: "Advanced bronchiectasis cannot be cured by medications, inhalations, intratracheal injections, intratracheal irrigations, climatotherapy or vaccines." The present results of medical management, even with the newer antibiotics, do not appear sufficiently gratifying to present a serious challenge to resection therapy, although adequate statistics on this point are not yet available. The classic survey of Perry and King *(38)* indicated the poor prognosis of patients treated medically. King *(39)* recently commented on the apparent reduction in the number of patients with the severe saccular bronchiectasis on which their report was based. He therefore emphasized the need for caution in treating surgically those patients who show "a maximal bronchographic extent of otherwise minimal disease." Chamberlain *(40)* has also mentioned a recent reduction in the number of patients seen with well-developed bronchiectasis for which resection is indicated, and Clagett *(41-43)* has noted a progressive decline in the number of resections performed for bronchiectasis, while the incidence for other causes has continued to rise.

This apparent trend may possibly be due to improved results in the conservative management of already fully developed cases, but it probably mirrors instead a tendency towards satisfactory prevention by more efficient medical therapy of those disorders of which bronchiectasis is a common sequela. The availability of potent antibiotics has resulted in a sharp reduction in the incidence of bronchopneumonia and other acute pulmonary infections which are common precursors of bronchiectasis.

In spite of the potentialities of conservative management for preserving the status quo of many bronchiectatic patients, no

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(34) Riggins, H. M.: Present concepts of pathogenesis, morbidity, mortality and treatment of bronchiectasis. Dis. Chest 9: 5-23, Jan.-Feb. 1943.

(35) Badger, T. L.: Bronchiectasis: treatment and prevention. New England J. Med. 237: 937-941, Dec. 18, 1947.

(36) Perry, K. M. A., and King, D. S.: Bronchiectasis; study of prognosis based on follow-up of 400 patients. Am. Rev. Tuberc. 41: 531-548, May 1940.

(37) Robinson, S.: Surgery of bronchiectasis. Surg., Gynec. & Obst. 24: 194, 1917.

(38) Perry, K. M. A., and King, D. S.: Bronchiectasis; study of prognosis based on follow-up of 400 patients. Am. Rev. Tuberc. 41: 531-548, May 1940. Cited in Scannell, J. G.: Medical Progress: Thoracic surgery. New England J. Med. 239: 961-972, Dec. 16, 1948.

(39) King, D. S. : Personal communication to Scannell. Cited in Scannell, J. G.: Medical Progress: Thoracic surgery. New England J. Med. 239: 961-972, Dec. 16, 1948.

(40) Chamberlain, J. M.: Personal communication.

(41) Clagett, O. T.: Personal communication.

(42) Clagett, O. T.: Indications for pulmonary resection. Kansas City M. J. 26: 4, 1950.

(43) Clagett, O. T.: Indications for pulmonary resection. Australian & New Zealand J. Surg. 20: 165-183, Feb. 1951.

alterations in the irreversible lesions of the disease can reasonably be expected, and extirpation continues to afford the only curative approach *(33, 44-46)*. Medical management nevertheless has contributed greatly to the comfort of those patients for whom resection is contraindicated or to whom, because of the extent of the disease or other considerations, a complete surgical program cannot be offered *(47)*. It has also made definitive operation possible in many patients who otherwise would not be suitable for excision.

An adequate medical regimen constitutes an indispensable component of the routine preoperative preparation of surgical candidates. It is directed toward mechanical drainage, control of infection, and improvement of the general health *(35)*. Effective postural drainage, rigidly supervised and carried out at frequent intervals (6 to 8 times daily), has been of paramount importance. The most effective posture depends somewhat on the location of the disease, but even for similar locations it may vary from patient to patient. It is customary to have the patient lie across a bed so that his hands are on the floor and his trunk inverted while he coughs and raises his secretions. Patients with middle lobe disease, however, are frequently better able to do this when lying supine. Others find the lateral decubitus position, with the diseased side uppermost, most favorable. The latter positions are most effective if the bed is placed in a rather steep Trendelenburg position. Each patient should be encouraged to experiment and to use that position which works best for him. He should not be instructed to carry out postural drainage for a given number of minutes, but rather to persist in his efforts until secretions can no longer be raised.

Use is made of the antibiotics, particularly penicillin, after culturing the sputum for predominating organisms and testing them for sensitivity. Occasionally streptomycin or one of the kindred drugs will be found to be the treatment of choice. In patients for whom resection is not contemplated, it is particularly important to employ antibiotics only on definite indications and for brief periods in order to minimize development of resistance. These patients who must "live with their bronchiectasis" should exercise unusual diligence to avoid colds and exposure to the elements; occasionally, a change of climate is advisable. This group of bronchiectatics should maintain an optimum dietary regimen

(44) Ochsner, A.; DeBakey, M.; and DeCamp, P. T.: Bronchiectasis; its curative treatment by pulmonary resection; analysis of 96 cases. Surgery 25: 518-532, Apr. 1949.

(45) Allan, W. B.: Bronchiectasis; modern treatment. South. M. J. 41: 1049-1052, Nov. 1948.

(46) Lindskog, G. E., and Alley, R. D.: Bilateral bronchiectasis; analysis of 43 consecutive cases. Arch. Surg. 60: 465-472, Mar. 1950.

(47) Alexander, J.: Roles of medicine and surgery in management of bronchiectasis. Ann. Int. Med. 21: 565-579, Oct. 1944.

with due attention to vitamins and minerals as well as to caloric intake. Periodic therapeutic bronchoscopy not infrequently affords them beneficial results.

CLINICAL MATERIAL

With a view to indicating certain of the persisting problems entailed in the surgical management of bronchiectasis, a review was made of all patients who underwent operation for this disease on the thoracic surgical service in this hospital between June 1947 and June 1952. A total of 100 resections performed on 92 patients during that period constitutes the basis of this report. Certain of the earlier cases in this series have been discussed from general aspects in a previous article *(48)*. Military personnel on active duty constituted the majority of patients here reported. Consequently the series is composed chiefly of young men, although some veterans, retired personnel, and dependents were included. There were 85 men and 7 women, the average age of the men being 29.7 and of the women, 31 years. The youngest patient subjected to surgery was 17 years of age and the oldest 67. The known duration of disease prior to operation ranged from 1 week to 21 years (average 3.6 years). In many instances the probable duration far exceeded the known duration and frequently extended to childhood.

SYMPTOMS

Classically, a chronic cough productive of purulent sputum has been considered the most representative symptom of bronchiectasis. This was present in 95 percent of the patients here reported. The daily sputum production ranged from 5 to 250 cc. Hemoptysis, varying from slight streaking of the sputum to massive bleeding, had occurred at least once in 44 percent of the patients. Chest pain, recurrent pneumonic episodes, dyspnea, and constitutional manifestations of chronic sepsis were significant elements in many instances. Rarely a completely asymptomatic process was discovered when a routine roentgenogram of the chest suggested the necessity of bronchography. The reverse situation is far more common in that a standard film might appear quite normal in a patient with severe symptoms and serious bronchiectasis. In 1 patient, the only outstanding subjective or objective finding prior to bronchography was the presence of unexplained localized basal pulmonary rales on routine physical examination.

BACTERIOLOGY

Little emphasis has been placed on preoperative bacteriologic studies of the sputum because of the paucity of useful information

(48) Lyons, H. A., and Ryan, T. C.: Bronchiectasis. U. S. Armed Forces M. J. 1: 30-38, Jan. 1950.

obtained. The bacteriology of bronchiectasis is not that of the chronic bronchiectatic lung, but of the bronchopneumonia or other acute respiratory disease that marked the onset of symptoms (49). The pathogens most frequently recovered have been hemolytic and nonhemolytic strains of streptococcus, *Staphylococcus aureus, Hemophilus influenzae,* and *Klebsiella pneumoniae.* In 1 patient, *Brucella abortus* was cultured from the sputum and from basal segments of the right lower lobe removed 3 months later. An intensive search for *Mycobacterium tuberculosis* is routine, however, and no patient is subjected to operation until repeated smears of the sputum have proved negative. Cultures for acid-fast organisms, and occasionally guinea pig inoculations of the sputum, have been done where either the clinical or roentgenographic findings aroused a real suspicion of pulmonary tuberculosis.

ETIOLOGY

The common denominator in the genesis of bronchiectasis is the combination of bronchial infection and obstruction, but it is not always possible to establish a definitive cause. Often a patient with bronchiectasis may either appear to have acquired the disease de novo or present factors the etiologic role of which is merely inferential. Despite these difficulties, the possible factors concerned in the production of bronchiectasis in this series of patients were reviewed.

Almost half of the patients presented no data of significance in establishing even a presumptive cause. Childhood respiratory infections appeared important in the group of patients in whom conjecture as to the probable cause of the disease was possible. In 27, a clear-cut history of such an infection was obtained. This usually consisted of the occurrence of "severe bronchitis," "bronchopneumonia," or "bilateral pneumonia." In many patients such infections had been multiple. A frequent association of the initial attack with a childhood exanthematous disease was noted. Occasionally complications such as empyema had been experienced. In 20 additional patients, at least one definite pneumonic episode had occurred in adult life, and because of clinical relationships this was interpreted as a cause rather than a manifestation of bronchiectasis. As far as could be ascertained, in 2 patients the infection had been viral and in the remainder bacterial. All episodes had been severe or complicated and convalescence had been prolonged.

Chronic disease of the paranasal sinuses was a complaint in 12 patients, most of whom presented an additional history of respiratory disease to which more importance could be attached.

(49) Erb, I. H.: Pathology of bronchiectasis. Arch. Path. 15: 357-386, Mar, 1933.

Figure 1. There is a large tuberculous cavity in the superior segment of the left lower lobe. The patient was treated by temporary phrenic paralysis and the cavity closed. Figure 2. Right anterior oblique bronchogram showing contracted lower lobe of left lung and bronchiectasis.

A tuberculous cause was demonstrated in 2 patients, 1 with saccular bronchiectasis of all segments of the right upper lobe and the other with total involvement of the left lower lobe (fig. 1). In the latter patient, the cavity closed following a temporary phrenic nerve paralysis. Bronchograms (figs. 2 and 3) were obtained because he continued to cough and raise purulent sputum which was consistently negative for acid-fast bacilli. An excellent clinical result was obtained following lobectomy. In 2

Figure 3. Left lateral bronchogram showing the cylindrical bronchiectasis involving all segments of the left lower lobe.

patients an intrapulmonary metallic foreign body was undoubtedly the sole etiologic factor. One patient was known to have aspirated a tooth as a child. A history of a difficult dental extraction was elicited as the only potential cause in another patient. An intrabronchial foreign body was a possible etiologic agent in a patient who had inhaled a peanut hull at the age of 18 months, with subsequent productive cough which had persisted to the time of operation 19 years later. Examination of the resected lobe, however, failed to disclose the presence of the foreign body. Only 1 patient with bronchiectasis secondary to benign or malignant intrabronchial neoplasm is included in the present series (although

associated bronchiectatic changes were often found in patients who underwent resection for pulmonary malignancy). She was a 37-year-old woman who had had a chronic cough with purulent sputum, recurrent bouts of pneumonitis, and occasional small pulmonary hemorrhages in the 5 years preceding operation. Bronchoscopy revealed the presence of an adenoma of the proximal portion of the lower lobe bronchus near the middle lobe orifice. There was partial obstruction and severe bronchiectasis of the middle and lower lobe bronchi.

DEFINITIVE DIAGNOSIS

Although the presence of bronchiectasis may be inferred from a critical evaluation of the history, physical findings, and standard roentgenograms of the chest, bronchography is necessary for a definitive diagnosis. Not merely the existence of bronchiectasis, but also its extent and, of lesser import, its type, should be determined. With others *(33, 44, 45, 50-52)* we believe that complete mapping of the tracheobronchial tree is a preoperative requisite. Intelligent planning of the surgical program demands an accurate knowledge of the presence or absence of bronchiectatic changes in all lobes of both lungs, and incomplete bronchography cannot be expected to afford such information.

Many instances of unsatisfactory response to resection have probably resulted from a failure to appreciate the necessity of obtaining complete delineation of the bronchial tree prior to operation. In one of the patients seen early in this series, persistence of symptoms postoperatively prompted a more intensive bronchographic examination. This revealed the presence of extensive residual bronchiectasis in an area which was totally unsuspected preoperatively, not having been adequately visualized in the preoperative bronchograms. A second operation on the same side was necessary to effect complete symptomatic relief. Such unfavorable results are a constant threat if the absence of bronchiectasis in any lobe or segment is assumed without bronchographic confirmation. In 1 patient in this series, it was necessary to obtain 4 sets of bronchograms before satisfactory visualization of all bronchopulmonary segments was achieved. The complete distribution of the disease must be known before surgical intervention is considered.

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(50) Carr, D.; Skinner, E. F.; Denman, W. E.; and Kessler, C. R.: Physiological significance of bronchiectasis. Dis. Chest 16: 137-145, Aug. 1949.

(51) Souders, C. R.: Bronchiectasis and its management; report of 277 cases. Dis. Chest 16: 381-407, Oct. 1949.

(52) Paterson, J. F., and Crassweller, P. O.: Lobectomy for bronchiectasis; some reasons for its failure to satisfy all patients. Bull. Acad. Med., Toronto 22: 223-231, Aug. 1949.

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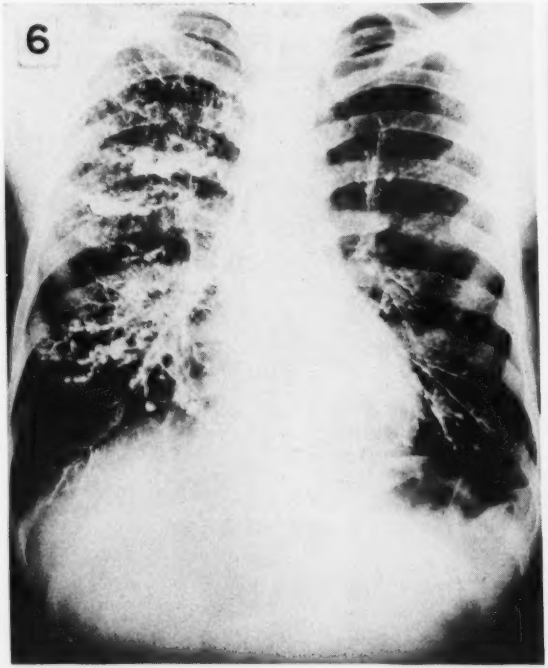
Figure 4. Posteroanterior bronchogram showing localized unilobar disease. Figure 5. Right anterior oblique bronchogram showing extreme cystic and saccular bronchiectasis involving all segments, including the superior, of the left lower lobe. There is no upper lobe involvement.

per lobe involvement.



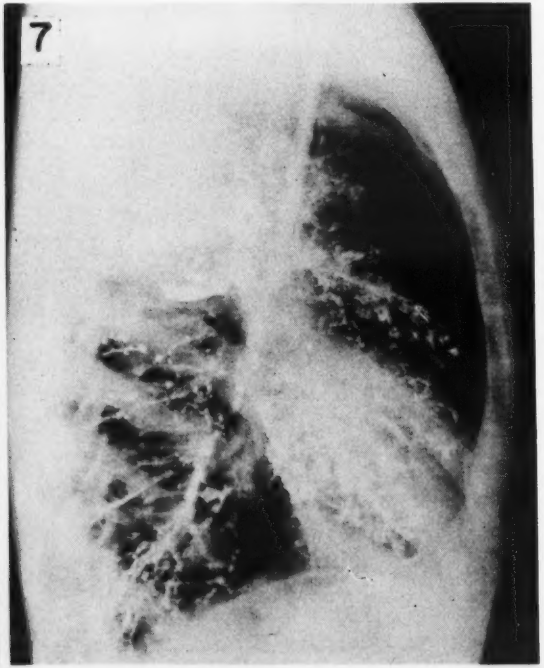


Figure 6. Bronchogram showing serious bronchiectasis in the upper as well as the lower lobe. Figure 7. Lateral view showing bronchiectasis in the posterior segment of the upper lobe as well as severe middle lobe involvement.

An example of localized unilobar disease is shown in figures 4 and 5. The right bronchogram (not shown) of this patient was negative. On the posteroanterior bronchogram alone, involvement of the lingula might be assumed. The bronchograms of another patient (figs. 6 and 7) demonstrate the necessity for complete mapping of the entire bronchial tree. In this patient a poor result would have followed resection of the middle lobe only. Figure 8

Figure 8. In this bronchogram the atelectatic middle lobe is clearly outlined. The middle lobe bronchi do not fill well, giving the "dead tree" appearance, and are cylindrically dilated. The remainder of the lung is free of disease.

illustrates the usual findings in a patient with "middle lobe syndrome." A good result is virtually certain to follow excision in a patient with disease of this distribution. The exact segments which were involved in the patient whose bronchograms are shown in figures 9 and 10 could be determined only in the oblique and lateral views. The site of the disease in this patient is unusual for a nontuberculous bronchiectasis. Neglecting to fill the upper lobes would have failed to demonstrate some or all of the disease. Figure 11 illustrates a common pattern of bilateral disease. Although all diseased segments *(9)* on both sides were removed (fig. 12), the patient's postoperative functional status was good.

Figure 9. Posteroanterior bilateral bronchogram showing severe saccular bronchiectasis in the upper half of the left lung. Figure 10. Bronchogram showing a bronchiectatic abscess of the lingula and severe cystic bronchiectasis of the apicoposterior segment of the upper lobe of the left lung.

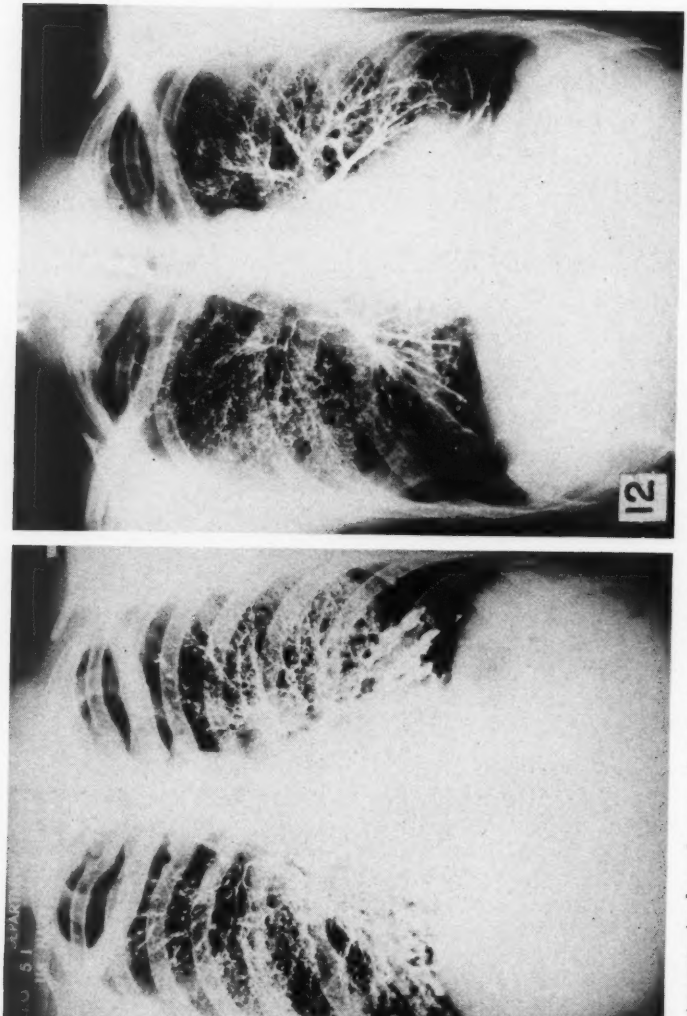


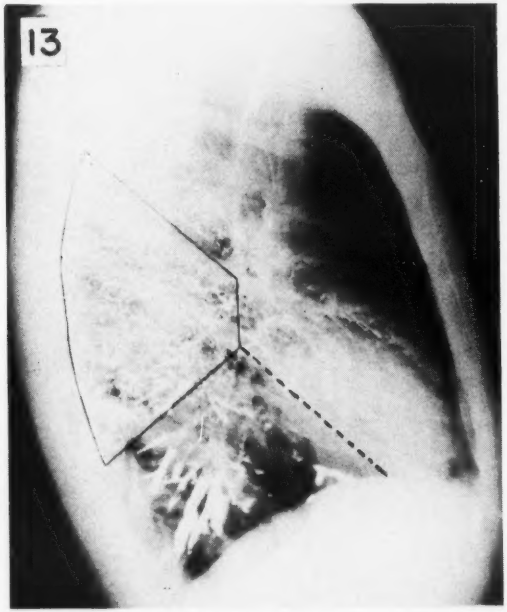
Figure 11. Posteroanterior bronchogram showing both sides filled with contrast medium. The right middle lobe and basal segments of the lower lobe of both lungs are involved. Figure 12. Bilateral bronchogram of the same patient made several weeks after the resection on the second side.

Much has been written concerning the development of new disease in the early postoperative period *(44, 52, 53)*. Although bronchiectasis is not considered a progressive disease in the usual sense, progression can undoubtedly occur. In order to evaluate such instances, however, adequate baseline bronchograms are necessary prior to operation. Otherwise it cannot be determined whether the changes were present but undiagnosed preoperatively, or whether they represent newly acquired lesions. Figure 13 shows the preoperative bronchogram of a patient with advanced cylindrical bronchiectasis of the basal segments of the right lower lobe. The normal superior segment shown in the postoperative bronchogram (fig. 14) was worth preserving. The postoperative course of another patient, whose bronchograms are shown in figures 15 and 16, was complicated.

Because of the frequently confusing findings presented by retained intrapulmonary contrast medium, every effort is made to obtain satisfactory bronchograms on the initial attempt. Prior to bronchography, a decrease in secretions is effected by antibiotic therapy postural drainage carried out several times daily, and preliminary bronchoscopy. Hypodermic injections of 65 mg. of codeine sulfate and 0.4 mg. of atropine sulfate and the oral administration of 0.1 gram of pentobarbital sodium are used prior to bronchography. Anesthesia is obtained with topical pontocaine hydrochloride solution (2 percent to spray the oropharynx and by applicator in each pyriform sinus, and 1 percent by instillation in the larynx, trachea, and bronchi). Through a transoral, intratracheal 16 Fr. rubber urethral catheter, under direct fluoroscopic visualization, radiopaque oil is first introduced into the bronchial tree of the lung clinically considered as probably the seat of the most extensive involvement. Satisfactory positioning of the subject is accomplished using essentially the technic described by Schmidt *(54)*. Stereoscopic posteroanterior and appropriate oblique views, as well as a single lateral view of the side filled first, are taken. A similar procedure is followed on the second side, with omission of the lateral projection because it would have no value when both lungs contain contrast medium. Excellent delineation of the entire tracheobronchial tree is usually achieved at one sitting. Should the results be unsatisfactory, excision is deferred until fully satisfactory bronchograms have been obtained. This is commonly but a minor problem, involving improved filling of one or several adjacent segmental bronchi which were not well delineated on the original bronchograms, but some delay is entailed in awaiting expulsion of the original radiopaque material.

(53) Kergin, F. G.: Surgical treatment of bilateral bronchiectasis. J. Thoracic Surg. 19: 257-265, Feb. 1950.

(54) Schmidt, H. W. (Rochester, Minn.): Method of obtaining bilateral bronchograms. Proc. Staff Meet., Mayo Clin. 23: 71-77, Feb. 4. 1948.



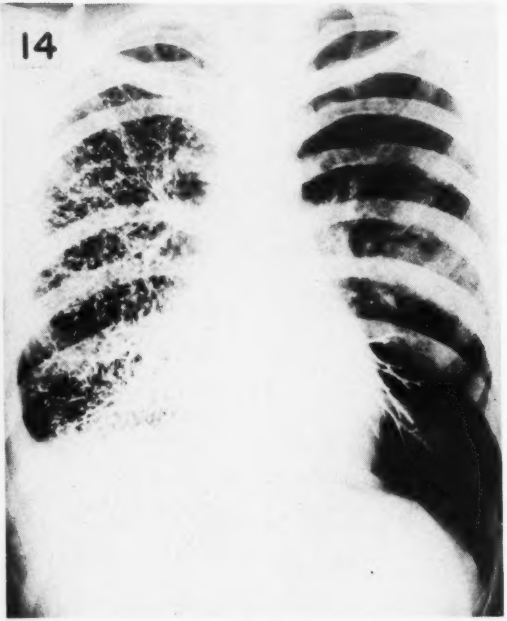


Figure 13. Right lateral bronchogram. Note the large normal superior segment (outlined by solid lines). Following resection of the basal segments, this superior segment rotated downward to fill the triangular space left by their removal (between the dotted line and the lowest solid line). Figure 14. Right bronchogram made following resection of the basal segments of the right lower lobe. A normal superior segment is well delineated. This large, healthy segment of lung is worth preserving.

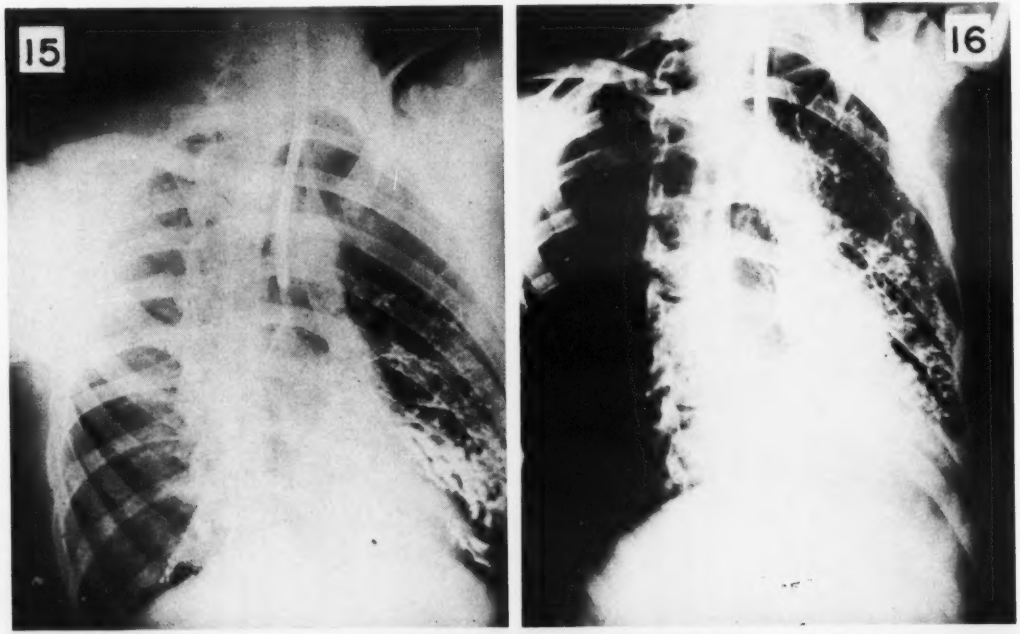


Figure 15. Right anterior oblique bronchogram showing cylindrical bronchiectasis of all basal segments of the left lower lobe with a normal superior segment. Figure 16. Right anterior oblique view made following resection of the left basal segments. The atelectatic superior segment can be faintly seen overlying the heart shadow. It shows definite cylindrical bronchiectasis of all divisions.

Although not comparable to roentgen contrast studies in outlining the distribution of the disease, bronchoscopy frequently furnishes important information which may be obtained in no other manner. Occasionally the results may be entirely within normal limits, furnishing significant negative data. Localized mucosal hyperemia, abnormal secretions, or both, are often the only indication of a more distal disease process. Such etiologic factors as a foreign body or a tumor may be disclosed, thus dictating alterations in the proposed operative management. In patients with bilateral bronchiectasis in whom the bronchographic extent of disease is about equal in the 2 lungs, bronchoscopy may be a decisive factor in indicating the side of initial surgical attack. The lung giving rise to the greater amount of secretions is favored for primary operation in such cases. At times, patients with minimal bilateral bronchiectasis and in whom recurrent severe hemoptysis invalidates an otherwise satisfactory conservative regimen are encountered. Bronchoscopy may be indispensable in such instances in determining the side of the bleeding and hence the side for resection.

Whenever possible, endoscopy should precede the initial bronchography in order to facilitate satisfactory filling of the tracheobronchial tree by aspiration of retained secretions. This sequence has been followed in most of the patients included in this report. It is usually not feasible to carry out bronchoscopy and bronchography on the same day, but bronchograms are obtained as soon after bronchoscopy as practicable. In young children who require general anesthesia for bronchoscopy, the 2 procedures are carried out in succession under the same anesthetic.

Although some *(51)* are of the opinion that preoperative bronchoscopy may safely be dispensed with, provided bronchograms have been successful and no lobe or segment is obstructed, we agree with Woodward and White *(55)* that bronchoscopy should be employed in *all* patients with bronchiectasis as a routine examination, and hold that its use is mandatory in all patients in whom resection is contemplated.

PREOPERATIVE REGIMEN

Surgery in bronchiectasis is elective in nature, and once the decision for resection has been made an additional period of intensive preoperative preparation may be necessary in order that the operation be undertaken under the most favorable conditions possible *(56)*. General measures such as appropriate diet, vitamin

(55) Woodward, F. D., and White, M. L., Jr.: Use of bronchoscopy in bronchiectasis. Dis. Chest 16: 94-99, July 1949.

(56) Boyce, F. F.: Principles and practices in lobectomy (including segmental resection) and total pneumonectomy for bronchiectasis and chronic lung abscess. Dis. Chest 17: 206-225, Feb. 1950.

therapy, and the study and treatment of concomitant cardiovascular, hepatic, renal, or other coexisting disease are used. Preoperative blood transfusions are indicated fairly often. Effort is made to assure a nearly normal circulating blood volume prior to operation.

The special treatment afforded patients being prepared for excision closely parallels that suggested for the medical management of bronchiectatic patients. Postural drainage is instituted in those in whom the amount of sputum is significant. Penicillin intramuscularly and by aerosol *(57)* or intrabronchially is given routinely. This usually effects a pronounced reduction in the amount and viscosity of the sputum. Streptomycin or a related agent is sometimes used in similar fashion, but only on definite indication. Therapeutic bronchoscopy with aspiration may be advisable and in some patients is done repeatedly.

Examination of the ears, nose, throat, and teeth constitutes a part of the routine preoperative work-up, and indicated therapy is instituted. Special care is paid to removing badly carious teeth and treating any sinus disease.

To minimize the possibility of a postoperative pneumonitis due to retained iodized oil, Kay et al. *(33)* advocated delaying the operation until about 5 weeks after the most recent bronchogram. We have done this in most of our patients, but several who showed a large amount of residual oil on films or fluoroscopy immediately before operation have developed no postoperative complications attributable to its presence. We believe that the elimination of the radiopaque medium is desirable, not because of the possibility of pneumonitis, but because its presence may interfere with satisfactory interpretation of the roentgenograms of the chest in the immediate postoperative period. The physiologic harmlessness of retained lipiodol has been confirmed by the clinical experiments of Black and Roos *(58)*, who concluded that "the fear of impaired transalveolar diffusion should not delay an intrapleural operation more than a few days after bronchography." Within the past year, excision has not been delayed in any of our patients merely because of recent bronchograms or retained lipiodol, and has often followed bronchography within less than 1 week. No complications ascribable to this practice have been demonstrated.

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(57) Olsen, A. M.: Nebulization therapy in bronchiectasis; use of penicillin and streptomycin aerosols. J. A. M. A. 134: 947-953, July 12, 1947.

(58) Black, H., and Roos, A.: Effects of lipiodol on alveolar gas exchange; preliminary report. In Surgical Forum; Proceedings of the Forum Sessions, Thirty-sixth Clinical Congress of the American College of Surgeons, Boston, Mass., October 1950. W. B. Saunders Co., Philadelphia, Pa., 1951. pp. 13-17.

KEY

(JACKSON-HUBER NOMENCLATURE)

RIGHT

LEFT

PNEUMONECTOMY

3 CASES

4 CASES

UNILATERAL SUBTOTAL RESECTION - RIGHT

3 CASES

1 CASE

5 CASES

2 CASES

1 CASE

1 CASE

1 CASE

1 CASE

11 CASES

1 CASE

2 CASES

1 CASE

3 CASES

6 CASES

UNILATERAL SUBTOTAL RESECTION - LEFT

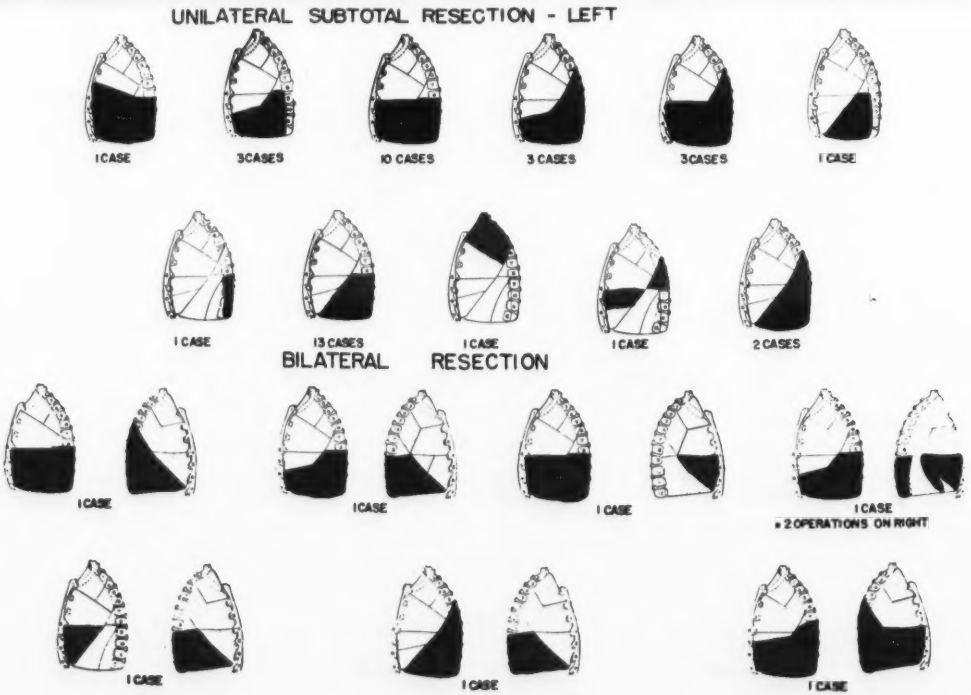

Figure 17. Schematic representation of the extent and distribution of resections in 92 patients.

Studies of pulmonary function may be necessary in patients whose respiratory reserve is clinically dubious. Present technics permit a fairly precise estimation of a patient's pulmonary functional status, and such information will carry a decisive weight for or against operation in a borderline case. We have recently instituted a program of carrying out studies of pre- and post-operative function on all patients who undergo resection for bronchiectasis.

EXTENT AND DISTRIBUTION OF RESECTIONS

Figure 17 shows an analysis of the primary surgical procedures constituting the basis of this report. The most frequently resected areas were the lingula of the left upper lobe, the right middle lobe, and the basal segments of the lower lobe of both lungs. This is in agreement with the universally accepted distribution of bronchiectasis. Seven pneumonectomies were performed; 6 for severe total unilateral bronchiectasis without significant contralateral disease and 1 because of technical difficulties which rendered a lesser resection unfeasible. There were 11 patients with "right middle lobe syndrome," all treated by lobectomy. In addition, 1 right middle lobectomy was performed for bronchiectasis secondary to the implantation of a shell fragment and 1 because of an adjacent bronchial adenoma. The 7 patients with bilateral resection exemplified the classic pattern of the disease when significantly affecting both lungs. Bronchograms of one of these are shown (figs. 18 and 19). Seven patients with unilateral resection were awaiting a second operation for contralateral disease at the time of writing. The superior segment of the lower lobe was preserved in 46 instances in which resection of all the basal segments of the corresponding lobe was performed (figs. 13 and 14).

Resection of the entire lower lobe, both segments of the lingula, and the inferior subsegment of the anterior segment of the left upper lobe was the most extensive operation on a single side short of total pneumonectomy. The diseased segments were greatly contracted and compensatory distention of the healthy segments was found to have already taken place at the time of operation. Although only 1½ of the original 8 bronchopulmonary segments were preserved on the left side in this patient, they filled the left hemithorax adequately (fig. 20). This ultraconservative program was elected in lieu of left pneumonectomy because it is possible that this patient will require excision on the right side in the future. His postoperative functional status has been found to be satisfactory.

We have not hesitated to remove subsegments while preserving the undiseased portions of the segment when conservation of all possible healthy portions of lung appeared to be highly desirable.

Figure 18. Bilateral bronchogram showing involvement of the entire middle and lower lobes of the right lung and of the lingula and lower lobe of the left lung. Figure 19. Left anterior oblique bronchogram made following the removal of the lower and middle lobes of both lungs. Note how well the healthy upper lobe fills the right hemithorax.

Bronchograms which clearly delineate all diseased areas, a knowledge of the bronchovascular anatomy of all segments of both lungs, and dissection carried out with painstaking care make subsegmental resections surgically feasible. Thus in 1 patient, whose totally bronchiectatic right middle and lower lobes were removed at the first operation, the basal divisions of the left

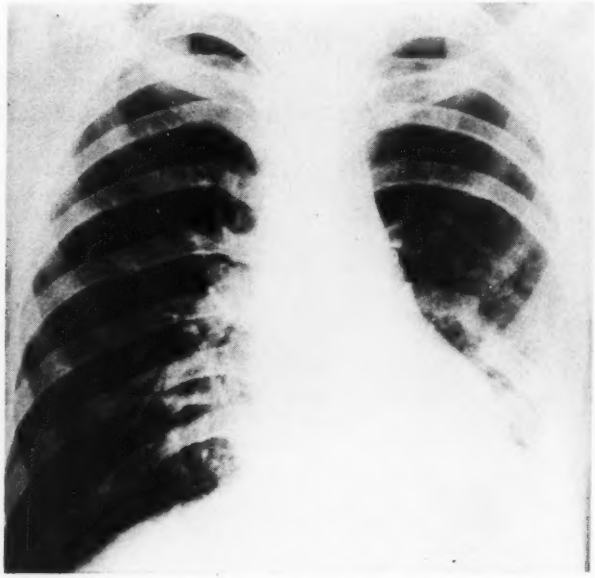

Figure 20. Roentgenogram showing the residual pulmonary tissue adequately filling the hemithorax of a patient from whom all segments of the left lung except the apicoposterior and a portion of the anterior segment of the upper lobe have been removed.

lower lobe, the inferior subsegment of the superior segment of the left lower lobe, and the inferior subsegment of the superior segment of the lingula were removed at operation on the left side. His postoperative course was without significant complications and although he now has only 5 11/12 of his original 18 bronchopulmonary segments (fig. 21) his pulmonary function is adequate.

In spite of our desire to conserve all healthy lung, we are reluctant to split the basal segments. It is usually preferable to remove all of the basal segments if one or more of them are involved. When some of the basal segments are excised and one or more are left behind, they do not always "fit" the pleural space well and there is a tendency to distortion as the residual lung re-expands. Because precise identification of the various basal

segmental bronchi is not always possible, there is the hazard of leaving the diseased segment behind and removing a healthy one. The mistake in identification of a basal bronchus may occur during the evaluation of the preoperative bronchograms or at the time of operation. In either event, the result is distressing. The arteries and veins of the segments to be retained cannot invariably be avoided with ease and the location of the inferior pulmonary vein

Figure 21. Posteroanterior roentgenogram of the chest of a patient from whom slightly more than 12 bronchopulmonary segments have been resected. This patient's preoperative bronchograms are shown in figures 18 and 19. Residual lipiodol is seen in the right lower lung.

impedes dissection. Our limited experience with removing only a portion of the basal segments leads us to believe that pleural complications are greater when this is done, even though it has been possible to perform a resection which was technically satisfactory. For these reasons we divide the basal segments only when there appear to be compelling reasons for doing so.

SELECTION OF PATIENTS

There are no all-inclusive unerring criteria whereby those patients who will be greatly benefited by resection may be selected, but the more localized the disease the better the expectation of complete extirpation with a curative or greatly beneficial result. Age per se is not considered a barrier. Although this series includes no young children, it has been well established

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that the very young withstand major intrathoracic surgery amazingly well, whereas untreated bronchiectasis which has its inception in infancy or early childhood carries the highest eventual mortality rate. In older patients, concomitant cardiovascular or other degenerative diseases that would contraindicate a major elective operation of any nature would be deterrents to resection for bronchiectasis, without necessarily precluding it.

Perhaps the most controversial problem in the selection of surgical candidates revolves around those patients with minimal localized disease. The bronchographic extent of disease does not always parallel the symptomatology. One patient had severe symptoms suggestive of bronchiectasis on the right side. Bronchoscopy showed profuse purulent secretions from the right middle lobe and basal divisions of the right lower lobe. Bronchoscopy and bronchography showed a normal left lung. The patient had several bouts of pneumonitis on the right side and numerous episodes of hemoptysis. The right middle lobe and basal segments of the right lower lobe were resected and the clinical result was excellent. The patient presented an excellent example of marked symptoms with minimal bronchographic evidence of bronchiectasis (figs. 22 and 23). A patient with distinct localized bronchiectasis, even though it may be of minimal extent, who experiences hemoptysis or other serious manifestations should be considered for excision. The more severe the symptoms, the more advisable is resection. In bronchiectatic patients with few or no symptoms, the immediate risk of thoracotomy must be weighed against the long-term risk inherent even in asymptomatic localized bronchiectasis. Resection has usually been excluded in such patients, either by the patient or the surgeon. These patients nevertheless warrant vigilant scrutiny, and the appearance of symptoms ascribable to bronchiectasis should signalize reconsideration of operation.

The problem of asymptomatic bronchiectasis involving an entire lobe or more is somewhat different, because the passage of time will inevitably bring the onset of symptoms, and resection is indicated in such patients. Reference has been made to one such patient, a 24-year-old man who was found on examination for re-enlistment to have constant unexplained pulmonary rales on the right side. Apart from the occurrence of pneumonia at the age of 6 years, his respiratory history was not significant. Standard chest roentgenograms were negative but bronchography disclosed bronchiectasis of the right middle lobe and basal segments of the right lower lobe. The patient underwent right middle and lower lobectomy and gross and histologic study of the resected specimen confirmed the bronchographic findings. The postoperative course was uneventful. It is believed that in this patient operation prevented the development of serious pulmonary symptoms.

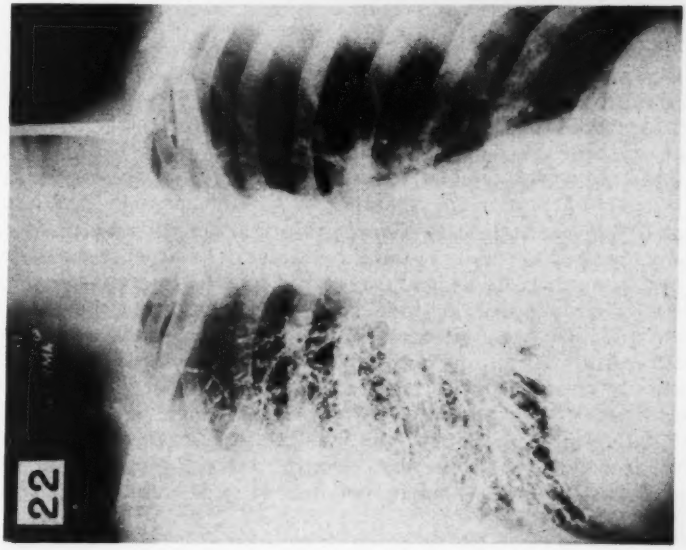

Figure 22. Posteroanterior right bronchogram which might easily be interpreted as normal. Figure 23. Right lateral bronchogram showing mild cylindrical bronchiectasis of the right middle lobe and only questionable disease of the right basal segments.

THE SURGICAL PROGRAM

In many patients, such as those showing unilateral localized bronchiectasis, the surgical ideal of extirpating all diseased tissue may be readily accomplished. In the more complicated cases, however, other aspects must be considered. The desirability of removing all demonstrable disease depends on several factors. In a patient with no contralateral involvement and a good respiratory reserve, it is preferable to resect all areas of involvement, provided the bronchographic evidence is definite. Studies of pulmonary function may dictate the surgical program for borderline cases. In a patient with poor respiratory reserve and no contralateral disease, it is probably better to resect the major foci only, preserving such lesser areas of bronchiectasis as may be present. The same program is recommended should established disease of lesser extent be present on the contralateral side. In such patients a more conservative resection is to be favored over a concerted attack on all the demonstrable bronchiectasis. Careful follow-up over an adequate period will then indicate those who require further resection. Most patients with slight residual bronchiectasis following operation have not required additional resection. A "95 percent cure" is frequently anticipated as a definitive result, fully acceptable to the patient and the surgeon alike. The rationale of incomplete resection in such patients has received recent confirmation from the long-term follow-up studies of Rosemond et al. *(59)*.

Patients with bilateral bronchiectasis of unequal distribution pose the problem of choosing the side of initial resection. Most surgeons favor attacking first the side presenting the more extensive disease as demonstrated bronchographically *(46)*. Others *(53)* prefer to undertake the lesser resection first, believing that the danger of anoxia is greater during the second resection because of the reduction of the contralateral lung by the previous operation and that their method guarantees a larger functioning lung at the critical second stage. The former approach has, however, been adopted in this series of patients and the method appears to have been fully justified. In several instances symptomatic relief following removal of the major focus has been sufficiently dramatic to warrant indefinite postponement or virtual abandonment of the contralateral resection which had been contemplated originally. Should the contralateral resection be necessary, however, the previous removal of the principal source of purulent secretions renders the second procedure much safer.

(59) Rosemond, G. P.; Burnett, W. E.; and Humphrey-Long, J.: Prognosis of residual bronchiectasis after incomplete resection. J. Thoracic Surg. 22: 439-448, Nov. 1951.

Segmental pulmonary resection, as conceived by Churchill and Belsey *(32)* and popularized by Overholt and Langer *(60, 61)*, has as its prime objective a maximum conservation of healthy lung parenchyma by reducing the size of the anatomically resectable pulmonary unit, which previously had been the lobe. This technic is particularly applicable to a disease such as bronchiectasis, which is segmental in type but frequently multilobar in distribution. The concept of retaining as much nondiseased pulmonary tissue as technically possible has, however, recently been challenged in one of its aspects by Kergin *(53)*. He believed that resection of all the basal segments of a lower lobe, with preservation of an undiseased superior segment alone, should be abandoned because of the high incidence of pleural complications in such patients and because of the tendency of the residual superior segment to develop bronchiectasis. In such a situation he advocated total lower lobectomy. A solitary residual superior segment of a lower lobe has been incriminated by others also as a cause of postoperative complications.

As early as 1939, Churchill and Belsey *(32)* drew attention to the occurrence of complete or partial atelectasis "in the dorsal segment of the lower lobe after resection of the inferior segments" and attributed it to "the inflammatory edema that must surround the focus of secondary healing in the bronchial tree." Coleman *(62)* reported his experience with 2 patients in whom a solitary residual superior segment showed poor aeration postoperatively. Bronchoscopy in those instances disclosed anterior rotation of the segmental orifice and this was considered to have been a possible factor in the development of postoperative atelectasis of that particular segment. Overholt et al. *(63)* mentioned 2 patients with "engorgement of the remaining superior segment of the lower lobe following segmental resection of the basal group." The first was proved at autopsy, which showed the residual superior segment to be engorged with blood without evidence of necrosis. The second was diagnosed by roentgenograms but made a satisfactory recovery. This complication of engorgement was attributed by the authors to possible obstruction of the venous drainage of the superior segment attendant on manipulation

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(60) Overholt, R. H., and Langer, L.: New technique for pulmonary segmental resection; its application in treatment of bronchiectasis. Surg., Gynec. & Obst. 84: 257-268, Mar. 1947.

(61) Overholt, R. H., and Langer, L.: Technique of Pulmonary Resection. Charles C Thomas, Publisher, Springfield, Ill., 1949.

(62) Coleman, F. P.: Discussion of paper by Overholt, R. H.; Betts, R. H.; and Woods, F. M.: Multiple segmental resection in treatment of bronchiectasis. Dis. Chest 13: 583-595, Nov.-Dec. 1947.

(63) Overholt, R. H.; Woods, F. M.; and Ramsay, B. H.: Segmental pulmonary resection; details of technique and results. J. Thoracic Surg. 19: 207-220, Feb. 1950.

and dissection of the basal segments. Chamberlain and Ryan *(64)* preferred to preserve a solitary superior segment of the lower lobe, believing that although the actual contribution of the residual segment to total pulmonary function is probably not great, it is of significant value as a "filler." Overholt and Woods *(65)* maintained that preservation of a residual superior segment of a lower lobe is justified because, in most patients, "there is less distortion of the remaining lung as it re-expands because the remaining superior segment of the lower lobe conforms to the triangular space left behind and below the upper lobe and the middle lobe or lingula if they are present."

We have reviewed our operative cases from this aspect. In 46 resections of the series here presented, all the basal segments of a lower lobe were removed, with preservation of the corresponding superior segment. Pleural complications in these patients occurred with no greater frequency than was experienced with segmental resections involving other areas, and the proportionate number of complications was not significantly larger than those noted following complete lower lobe resection. Of the 46 patients, 33 have been considered suitable for study in this regard, satisfying the requirement of a postoperative interval of about 6 months in most cases and the availability of unequivocal preoperative and postoperative bronchograms. In 30 of these patients there has been no evidence of postoperative bronchiectasis of the solitary residual superior segment. These results are contrary to the experience of Kergin *(53)*.

The 3 patients who developed new disease postoperatively in a previously healthy superior segment will be mentioned briefly. One of these, a 28-year-old woman, had severe cylindrical and saccular bronchiectasis involving the lingula and the basal segments of the left lower lobe as well as marked disease of similar type affecting the anterior segment of the right upper lobe, the right middle lobe, and the basal segments of the right lower lobe. The affected segments on the left were resected and her postoperative course was smooth. There was prompt pulmonary re-expansion and her drainage tubes were removed on the first postoperative day. She was greatly improved following operation. Bronchograms 6 months later, however, showed definite cylindrical bronchiectasis of the residual superior segment of the left lower lobe. The second patient also had bilateral disease. The lingula and basal segments of the left lower lobe were resected. His postoperative course was complicated by recurrent atelectasis on the left which necessitated repeated therapeutic bronchoscopy.

(64) Chamberlain, J. M., and Ryan, T. C.: Segmental resection in pulmonary diseases. J. Thoracic Surg. 19: 199-206, Feb. 1950.

(65) Overholt, R. H., and Woods, F. M.: Segmental pulmonary resection for bronchiectasis. South. Surgeon 13: 777-784, Nov. 1947.

Difficulty was experienced in obtaining re-expansion of the remaining segments of the left lung and the thoracotomy drainage tubes could not be removed until the fifth day. The patient eventually developed a bronchopleural fistula and a small basal empyema. It was not surprising that his postoperative bronchograms showed bronchiectasis of the previously normal superior segment (figs. 15 and 16). In another patient, resection of the basal segments of the left lower lobe was performed as the first of bilateral operations. The postoperative course was uncomplicated. Bronchograms secured after resection showed minimal cylindrical bronchiectasis of one subsegmental bronchus in the residual superior segment. Preoperative roentgenograms of this area were not of sufficiently good quality to delineate all bronchi well, and it is possible that the minimal bronchiectasis visualized postoperatively was present prior to resection.

Of the 33 resections analyzed, definite bronchiectasis in a retained superior segment of a lower lobe developed in 2, an incidence of about 6 percent. One patient showed minimal bronchiectasis which may have been present preoperatively, and the remaining 30 had entirely nonbronchiectatic superior segments on adequate bronchograms usually made 6 or more months after resection. Of the 13 patients who failed to meet the criteria of adequate pre- and post-operative bronchograms and sufficient interval following resection, none showed clinical evidence of bronchiectasis when last seen.

Preservation of a nonbronchiectatic superior segment of a lower lobe in which all the basal segments are resected appears, therefore, to be a justifiable and useful procedure. In order to accomplish this with the anticipation of good results, the presence of endobronchial disease must be satisfactorily excluded prior to resection and strenuous efforts must be directed toward the prevention of postoperative complications such as atelectasis and delayed pulmonary re-expansion (figs. 15 and 16).

OPERATIVE CONSIDERATIONS

All resections in this survey have been performed according to a standard plan of procedure. Preanesthetic medication, in addition to the usual atropine, morphine, and barbiturate, includes procaine amide hydrochloride, which is given in a dose of 1 gram by mouth prior to the induction of anesthesia. Endotracheally administered nitrous oxide-oxygen-ether has been the anesthetic of choice. Pentothal sodium has been given intravenously for induction of anesthesia on a few occasions. We strongly recommend that the anesthesia be kept simple and that polyanesthesia be avoided.

The posterolateral approach is routinely used, with the patient in the lateral decubitus position. In a brief trial, the face-down position advocated by Overholt and Langer *(60, 61)* has appeared to present no advantage except in the control of secretions, the lung to be resected being dependent and tending not to discharge secretions into the contralateral bronchial tree. In the present series, reliance has been placed on other measures. The preoperative use of postural drainage and antibiotics usually greatly reduces excessive secretions in patients who might otherwise constitute a serious operative problem. Should troublesome secretions persist, bronchoscopy with aspiration is performed immediately prior to the induction of anesthesia for operation. Minimal topical anesthesia is used for bronchoscopy in order to assure maximal coughing during the aspiration of secretions. The bronchus serving the area to be resected is clamped as promptly as possible in the course of the operation in order to secure early isolation of the distal mucopurulent reservoir. This can usually be accomplished soon after the chest is opened and before attention is directed to the vascular structures. Spillage is thus minimized. Vigilance on the part of the anesthetist in carrying out frequent aspirations through the endotracheal tube is an important protective measure against contralateral spillage of secretions. When indicated, aspiration bronchoscopy is carried out at the termination of the operation.

Depending on the area of lung to be excised, subperiosteal resection of either the fourth, fifth, or sixth rib is performed to provide adequate exposure. An intercostal incision is used in rare instances. The value of palpation in confirming the extent of bronchiectasis as determined by preoperative studies has been found to be strictly limited. This is in agreement with the findings of Pilcher *(66)*, who believed that while palpation may be extremely helpful in children because of a relatively more intense inflammatory reaction, its importance in adults is slight. The only really accurate information as to the extent and distribution of the disease is that obtained by bronchography and bronchoscopy. No reliance can be placed on the gross operative findings when performing an operation for bronchiectasis. Although the involved segments may be atelectatic, emphysematous changes are not uncommonly encountered, and there may be changes suggestive of chronic pneumonitis. In cases of long duration, particularly if the disease dates to childhood, the affected areas may show a relative reduction in the amount of anthracotic pigmentation. Even more commonly, the lung may be entirely normal in appearance and consistency. These facts emphasize the point that preoperative studies must not only have clearly established the

(66) Pilcher, R. S.: Segmental resection of lung for bronchiectasis. Lancet 1: 843-846, June 8, 1946.

diagnosis of bronchiectasis, but adequate bronchograms must have delineated precisely the exact location of the disease. At operation the segments previously shown to be involved must be resected regardless of their gross characteristics.

The technic of careful hilar dissection and individual ligation is routinely used. The bronchial stump is closed with interrupted sutures of No. 000 black silk, although in several of the patients seen earlier No. 50 cotton was used. The type of suture material used in the bronchial closure appeared to exert no detectable influence on the incidence of empyema or bronchopleural fistula. Although free pleural grafts have not been used, a second layer of closure with adjacent pleura or peribronchial tissue is always accomplished. This is not a complete guarantee against the development of a bronchopleural fistula, but it contributes to earlier and more satisfactory healing of the bronchial stump. While the anesthetist applies positive pressure up to 20 mm. of water, the repair is tested under water for leaks, and any which are thus demonstrated are corrected. Gravimetric determinations of blood loss are recorded throughout the operation and serve as an index of the amount of blood replacement necessary to maintain a constant circulating blood volume. Immediately prior to closure of the pleura a solution containing 1 gram of streptomycin and 300,000 units of penicillin is instilled into the pleural cavity, unless a history of sensitivity to these agents has been elicited. Such topical use of antibiotics is purely empirical and is probably not necessary because suction removes a significant amount of the solution soon after its instillation.

Temporary interruption of the phrenic nerve in its intrathoracic course, either by crushing or by procaine infiltration, has been performed in some instances if the volume of lung parenchyma resected was relatively large. The problem of overdistension of the remaining pulmonary tissue following extensive resection has been a matter of great interest to us. Kay et al. *(67)* recorded a more favorable functional status postoperatively in those patients whose ipsilateral hemidiaphragm was temporarily paralyzed following pulmonary resection for bronchiectasis than that shown by a comparable group in whom the phrenic nerve was not crushed. In the relatively small number of patients in whom we have employed temporary phrenic paralysis, the postoperative course has seemed to be somewhat more difficult; this point, however, has not been definitely established.

When a subtotal resection has been completed, 2 thoracotomy tubes are routinely inserted and active suction is applied by means of a 2-bottle underwater seal suction setup (fig. 24).

(67) Kay, E. B.; Perkins, H. M.; and Crastnopol, P.: Fate of residual lobe following previous lobectomy. Tr. Nat. Tuberc. A. 1951, p. 194.

The amount that the height of the column of water in the second bottle exceeds that in the first bottle determines the amount of suction applied. When a high negative intrathoracic pressure is desired or when there is a large air leak, a tall bottle (50 cm.) replaces the second bottle. Full suction (determined by the power of the motor) results when the Hoffman clamp at the second

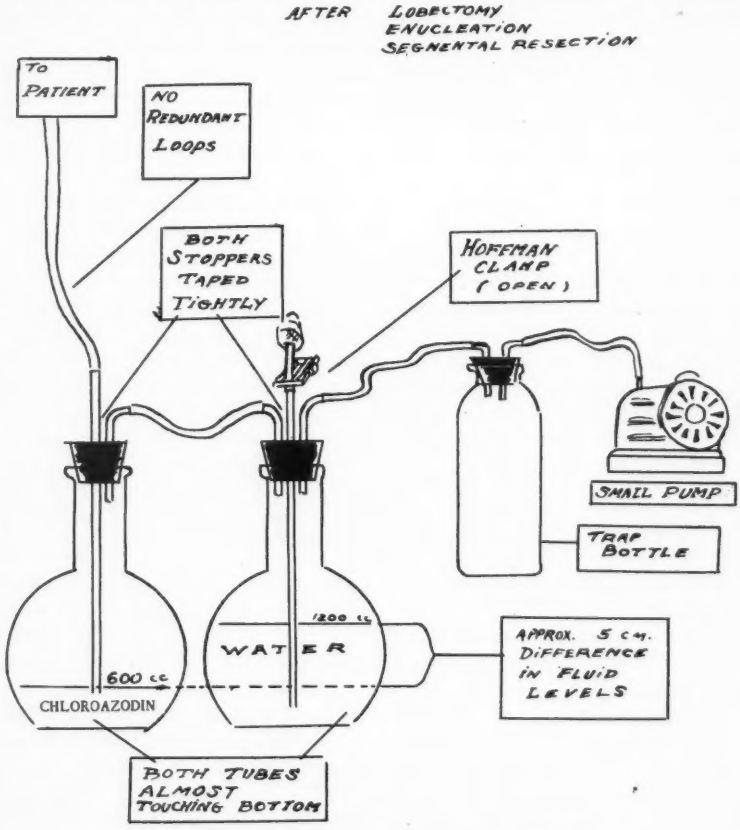

Figure 24. Postresection drainage apparatus.

bottle is closed. The trap bottle assures that no moisture enters the suction pump. Size 30 Fr. red rubber rectal tubes are used. Smaller tubes become plugged too easily. Placement of the tubes is most important. The posteroinferior tube is introduced through a stab wound and passes through the eighth intercostal space to lie in the paravertebral gutter. The anterosuperior tube traverses the second anterior intercostal space in the midclavicular line, its tip being fixed to the extreme apex of the pleural cavity by

a single fine absorbable suture. Each tube is passed through the chest wall obliquely so that it will assume a favorable position against the chest wall and so that no air will enter the chest when it is removed. In pneumonectomies only a small (16 Fr.) anterior catheter is used. It is attached to an underwater seal system without suction with a 2-bottle setup so arranged as automatically to maintain a nearly neutral intrathoracic pressure (fig. 25). A negative pressure may be obtained by increasing

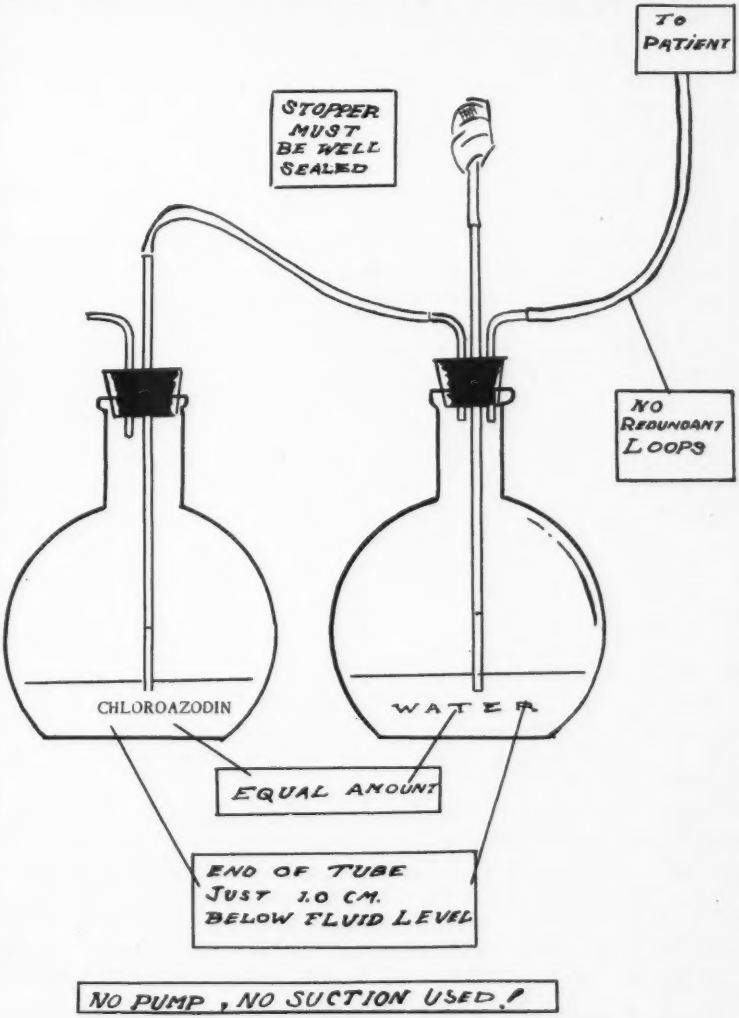

Figure 25. Postpneumonectomy drainage apparatus.

the amount of water in the right-hand bottle, the amount depending on the height by which the water column in this bottle exceeds that in the left-hand bottle. Conversely, a positive intrathoracic pressure may be achieved by shifting the height differential in the opposite direction.

STANDARD POSTOPERATIVE MANAGEMENT

Alert and careful postoperative care is important in patients who have undergone resection for bronchiectasis, and anticipated good results may be vitiated by unrecognized or inadequately treated complications. The postoperative responsibility rests not only on the operating surgeon but on the nursing staff as well. Skilled nursing care is indispensable. After operation the patient is returned to a previously warmed bed and frequent changes of position are effected. An intratracheal suction catheter is used as needed to remove secretions from the respiratory passages. Coughing is encouraged and assisted. In the early postoperative period the patient is frequently raised to the sitting position and the side of operation firmly supported while he coughs. A bedside roentgenogram of the chest is secured as soon as the patient has reacted from the anesthetic sufficiently to be raised to the sitting position and the postoperative pulmonary status thus determined. Subsequent roentgenograms are made at daily intervals for the first 3 postoperative days, or more frequently if indicated.

Because the administration of oxygen in the immediate postoperative period is a time-honored procedure, we were reluctant to abandon it. We have previously followed a series of patients in whom lung segments were resected for bronchiectasis who received oxygen routinely in the immediate postoperative period. The patients reported herein comprise a comparable group in whom oxygen was used only on definite indication. Our observations have convinced us that it is contraindicated except when the need for additional oxygen has been clearly established. Oxygen therapy is of prime value only in anoxic anoxia, and its routine use in the postoperative management of patients who have had a pulmonary resection is at best unnecessary and is frequently hazardous.

Price et al. *(68)* have shown experimentally that only when respiration was definitely embarrassed by central depression, tracheal obstruction, prolonged inspiratory resistance, pneumothorax, or constriction of the chest and abdomen was oxygen therapy of any demonstrable value. On the contrary, these investigators produced death by the administration of pure oxygen to dogs in the late stages of shock, when respiratory embar-

(68) Price, P. B.; Richards, R. C.; and Hammond, J. B.: Evaluation of oxygen therapy. Ann. Surg. 130: 747-754, Oct. 1949.

rassment coexisted with the hypotension, and concluded that the alleviation of dyspnea may decrease the pumping action on venous return of blood to the heart, resulting in a sudden fatal reduction of cardiac output. They also observed that relief of dyspnea by the administration of pure oxygen to dogs with respiratory difficulty was constantly associated with a significant fall in blood pressure.

One of the most dangerous features of oxygen therapy lies in the tendency to use it while neglecting to ascertain and correct the true cause of the patient's difficulty. Dyspnea, cyanosis, or hypotension in patients who have undergone resection for

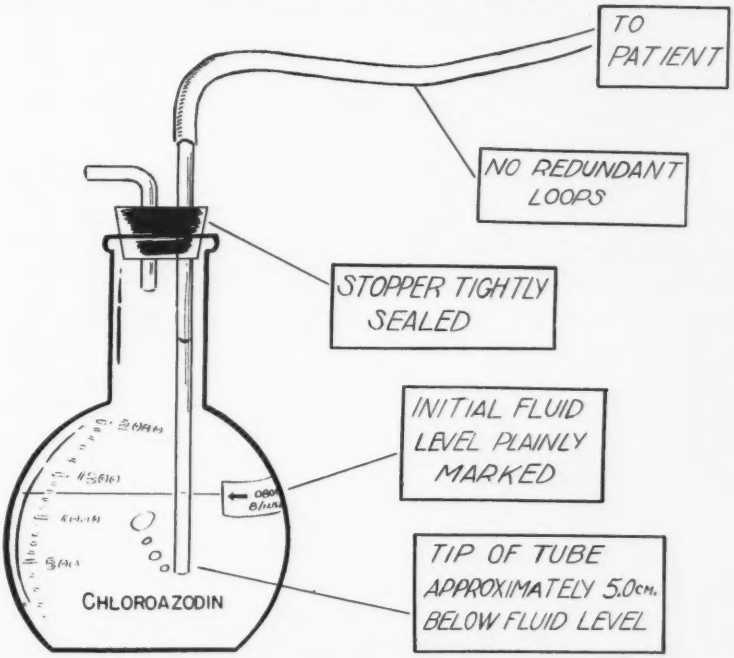

Figure 26. Simple underwater seal apparatus.

bronchiectasis are usually ascribable to such causes as an obstructed airway or inadequate circulating blood volume rather than to insufficient oxygen in the inspired air. Finally, the prolonged administration of oxygen tends to inspissate secretions and render them more difficult to raise, either by cough or by aspiration, thereby increasing the incidence of atelectasis. Although oxygen therapy has a definite role in the postoperative management of bronchiectasis, its indiscriminate use should be avoided.

Figure 27. Posteroanterior bronchogram showing total cystic and saccular bronchiectasis on the left. The right lung was free of disease. Figure 28. Left lateral bronchogram which confirms diagnosis of total bronchiectasis on the left.

Antibiotics, especially penicillin, are administered post-operatively as a prophylactic measure. Suction via the thoracotomy tubes is continued on the patients' return from the operating room. The amount of drainage obtained is carefully noted at frequent intervals. A negative pressure of from 8 to 10 cm. of water is used initially. This is increased, however, if there is an appreciable air leak. Sufficient negative pressure is used to "get ahead" of the air leak. This may amount to 40 or more cm. of water. Suction is continued until there is no further air

Figure 29. Roentgenogram taken 2 weeks after left pneumonectomy.

leak, insignificant fluid drainage, and good pulmonary re-expansion as shown by roentgenograms. At this juncture a trial of several hours on simple underwater seal (fig. 26) without suction is invoked in order to determine whether an air leak of significant magnitude will recur. Should no air be withdrawn on full suction at the conclusion of this interval, the tubes are removed; otherwise suction is continued and the procedure later repeated. Satisfactory pulmonary re-expansion could be obtained in most patients by the use of a simple underwater seal system, but active suction is more prompt and effective. In pneumonectomies, no suction is applied to the intercostal catheter, which is used

merely to obviate sudden pressure changes within the pneumonectomy space. Its use obviates the necessity for frequent thoracenteses for manometric determinations, and reduces the hazard of either a sudden tension pneumothorax or a dangerously high negative intrathoracic pressure. Ambulation is begun as soon as practicable, usually on the first or second postoperative day.

Permanent collapse therapy is indicated in patients who have had pneumonectomy or who develop mediastinal displacement or overdistention following lesser resections. Postpneumonectomy thoracoplasty was performed in 6 of the 7 patients who underwent total unilateral resection (figs. 27-29), the seventh having died during operation. This was accomplished as a one-stage procedure in all instances, the thoracoplasty being of the "tailoring type," involving the second through the eighth ribs. In this procedure moderately long segments of the ribs (but not the transverse processes) are removed. Little deformity results. A limited upper thoracoplasty was performed in 1 patient who had an upper lobe resection. Morbidity and mortality from secondary thoracoplasty have been nil.

TABLE 1. *Operative complications in 100 patients*

Complication	*Number*
Cardiac arrest	2
Fatal	(1)
Nonfatal	(1)
Operative hemorrhage (none fatal)	4
Mediastinal emphysema (laceration of trachea?)	1
Total	7

COMPLICATIONS AND MANAGEMENT

Despite careful selection, painstaking operation, and a satisfactory pre- and post-operative regimen, an uneventful course cannot be anticipated in all patients. The significant operative, postoperative, and late complications occurring in this series are shown in tables 1–4. Postoperative complications have been classified as major when satisfactory management demanded a return to the operating room; those successfully treated on the ward have been designated as minor.

In this series of 100 resections 2 patients died. The first was a 33-year-old man with severe symptoms and extensive bilateral disease. There was advanced saccular disease of the right middle

lobe and the anterior segment of the right upper lobe, but only moderate cylindrical involvement of the right lower lobe. Because of widespread disease on the left, for which a later resection was planned, only the middle lobe and anterior segment of the upper lobe were removed. The operation was rendered difficult by extremely dense adhesions and numerous hard, matted lymph nodes surrounding the middle lobe bronchus and vessels. The situation was one in which the modified tourniquet technic advocated by Bryant and Harter *(69)* might well have been used. Suitable lengths of the middle lobe vessels could not be freed for secure double ligation. The patient had a fatal hemorrhage on the first night after operation. Autopsy showed that the ligature, still attached to the viscero-vascular fascia, had rolled off the short stump of the medial branch of the middle lobe artery.

TABLE 2. *Major postoperative complications in 100 patients*

Complication	*Number*
Hemorrhage	3
Terminating fatally	(1)
Requiring reoperation for control	(2)
Large bronchopleural fistula with empyema	1
Acute surgical abdomen	1
Total	5

The second death occurred in a 25-year-old man whose left lung was totally destroyed by cystic and saccular bronchiectasis secondary to extreme stenosis of the left main stem bronchus. He had a huge anterior mediastinal hernia, most of the left chest being filled with herniated right lung (figs. 30-33). At operation the patient had what amounted physiologically to a bilateral open chest because of the greatly thinned-out and stretched mediastinal pleura. Frequent aspirations of purulent secretions were necessary throughout the operation, and when the positive pressure anesthesia was temporarily discontinued for this to be accomplished, the right as well as the left lung would collapse. During the late stages of the operation, the patient was frequently cyanotic despite heroic efforts on the part of the anesthetist to maintain adequate oxygenation. Postoperative bronchoscopy was performed and cardiac arrest occurred during the procedure. Prompt cardiac massage was of no avail and the patient died. It is reasoned that

(69) Bryant, J. R., and Harter, J. S.: Middle lobe disease. Dis. Chest 18: 250-253, Sept. 1950.

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the arrest was initiated by a "vagovagal" reflex. Sloan *(70)* has shown that these fatal reflexes occur almost exclusively in the presence of hypoxia.

TABLE 3. *Minor postoperative complications in 100 patients*

Complication		*Number*
Bronchopleural fistula		4
Small	(4)	
Large	(1)*	
Late air leak		11
Partial atelectasis		16
Operative side	(15)	
Contralateral side	(1)	
Pleural effusion		17
Sterile	(7)	
Contaminated	(4)	
Infected (empyema)	(6)	
Hemorrhage not requiring reoperation		1
Wound complications		2
Superficial wound dehiscence	(1)	
Subcutaneous abscess at tube site	(1)	
Pneumonitis, contralateral lung		1
Pneumothorax, spontaneous, contralateral side		1
Postoperative asthmatic episodes		3
Emphysema, subcutaneous, extensive		3
Hypotension, prolonged, not due to blood loss		1
Thrombophlebitis of leg veins used for infusion		2
Nerve injury		3
Radial nerve	(2)	
Neuralgic amyotrophy (shoulder-girdle syndrome)	(1)	
Total		65**

*One large bronchopleural fistula was encountered in this series. It is a major postoperative complication and is included in table 2. It is entered in this table also in order that the true incidence of bronchopleural fistulas may be reflected.

**In many cases, a single patient had several of these complications, and most patients had none at all.

The patient with cardiac arrest who died has been discussed; the other was a 23-year-old marine with extensive bronchiectasis of both lower lobes, undergoing the first of bilateral resections. In the course of testing the bronchial closure after resection of the basal segments of the right lower lobe, excessively hot irrigating fluid was used. Cardiac asystole resulted and was imme-

(70) Sloan, H. E.: Vagus nerve in cardiac arrest; effect of hypercapnia, hypoxia and asphyxia on reflex inhibition of heart. Surg., Gynec. & Obst. 91: 257-264, Sept. 1950.

diately detected. Vigorous cardiac massage resulted in restoration of spontaneous normal rhythm within 30 seconds. There have been no neurologic or other sequelas and the patient has subsequently undergone an uneventful contralateral resection.

TABLE 4. *Late complications in 100 patients*

Complication	*Number*
Jaundice (homologous serum?)	2
Bronchiectasis (new disease, not present prior to operation)	2*
Pulmonary tuberculosis with cavitation	1
Severe exacerbation of pre-existing atopic dermatitis	1
Total	6

*It has not been possible to study all patients bronchographically subsequent to their operation. If such studies could be carried out this figure might be somewhat higher. No other patients, however, had postoperative signs or symptoms suggestive of new disease.

There were 4 instances of operative hemorrhage of grave proportion. In 1 patient during right pneumonectomy, bleeding resulted from a tear in the main pulmonary artery, and intrapericardial ligation was necessary for hemostasis. In the second patient, the contemplated procedure had been resection of the right lower and middle lobes which were completely involved with cystic bronchiectasis, but hilar dissection was impeded by dense inflammatory tissue, and in the process of mobilization a rent which could not be repaired developed in the right main pulmonary artery. Pneumonectomy was therefore required. In a third patient, in whom resection of the posterior division of the apicoposterior segment of the left upper lobe was performed, a small tear occurred in the main trunk of the left pulmonary artery. Repair was effected by suturing the defect with No. 00000 atraumatic silk without compromising the arterial lumen. In the fourth patient, serious hemorrhage occurred during the course of a left lower lobe lobectomy. The main trunk of the pulmonary artery above the branch to the superior segment was torn during a difficult dissection. Suture was successfully accomplished.

One patient was observed to have mediastinal emphysema as soon as the chest was opened. The anesthetist had experienced great difficulty in introducing the intratracheal tube, and investigation of the cause of obstructed breathing showed that the Magill catheter was kinked on itself This was corrected and the operation proceeded uneventfully. There was moderate subcutaneous

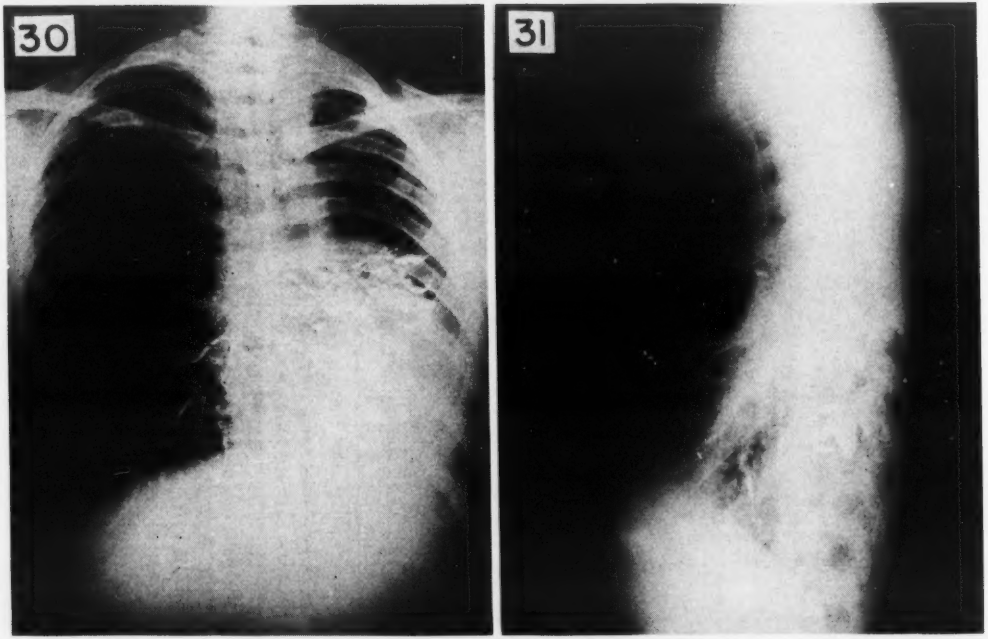
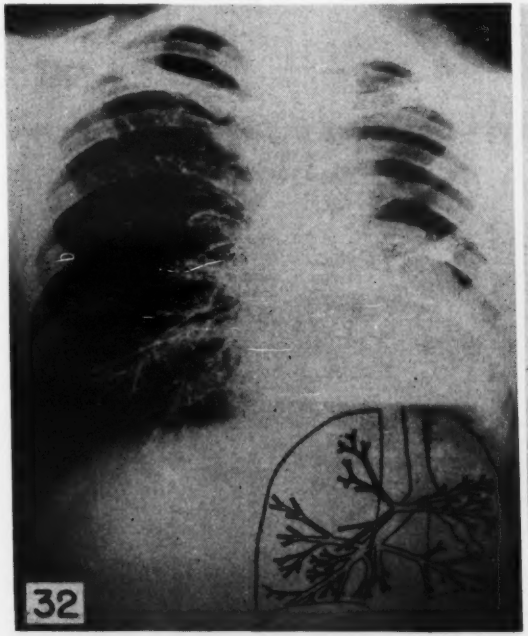


Figure 30. Posteroanterior left bronchogram showing extensive cystic and saccular bronchiectasis involving the entire left lung. The lung is completely atelectatic. The aerated lung in the upper chest represents herniated right lung. Figure 31. Left lateral bronchogram showing the totally bronchiectatic left lung which is greatly contracted and which lies in the costovertebral gutter. The normal bronchi seen in this projection represents oil in the right bronchial tree. Note the huge anterior mediastinal hernia.



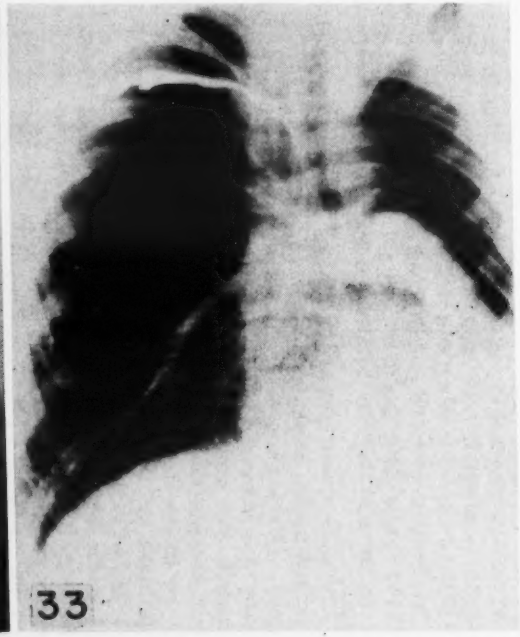


Figure 32. Postoeranterior bronchogram with only the right side filled. No lipiodol spilled over into the left bronchial tree at this examination. Although seen with some difficulty in reproduction, the original stereoscopic frontal films clearly outline the configuration of the right bronchial tree shown in the diagrammatic insert. Figure 33. Angiocardiogram which shows that the distribution of the right vascular structures exactly parallels that of the bronchi shown in figure 32.

emphysema of the face and neck postoperatively which required no treatment. Postoperative bronchoscopy revealed a small, jagged, eroded area in the mucosa of the posterior membranous wall of the proximal portion of the trachea just beyond the cords. We believe that this represented the site of a small tracheal laceration caused by the beveled tip of the intratracheal tube. It had sealed over spontaneously and required no special therapy. The patient's postoperative course was smooth and there were no symptoms suggestive of mediastinal infection. Antibiotic therapy was continued longer than usual in this patient and streptomycin was given for several days in addition to the penicillin which we give routinely.

There were 5 major postoperative complications in this series of resections. The patient with postoperative hemorrhage terminating fatally has been discussed. In 2 other patients postoperative hemorrhage was manifested by an undue amount of blood recovered from the pleural cavity via the thoracotomy tubes and by failure of the blood pressure to stablize despite repeated transfusions. Because in these 2 patients the degree of hemorrhage threatened life, the chest was reopened. In 1 patient this was done 14 hours postoperatively and disclosed several points of active bleeding from diaphragmatic adhesions which had been severed at the time of resection. These were ligated and the patient made an uneventful convalescence, which was no longer than that of the average uncomplicated case. Exploratory thoracotomy in the second patient was performed 8 hours postoperatively and revealed brisk hemorrhage from a small esophageal artery situated in the posterior gutter immediately inferior to the area from which the pleura had been mobilized for the second layer of bronchial closure. The bleeding point was ligated, and convalescence was neither complicated nor prolonged. These 3 cases of serious postoperative hemorrhage demonstrate that reoperation cannot be too long delayed in the presence of continued bleeding. In the patient who died, operative intervention was not considered imperative until he was moribund, by which time it was not feasible.

One patient developed extensive empyema and a large bronchopleural fistula following resection of the right middle lobe and basal segments of the right lower lobe. Culture of the purulent pleural exudate consistently yielded *Pseudomonas aeruginosa*. Intensive antibiotic therapy and drainage via an intercostal catheter failed to produce improvement and the empyema was not effectively controlled until open thoracotomy with resection of a short segment of rib had been performed. With adequate drainage, clearing was rapid and complete and the fistula quickly closed. Six months after his operation the patient was asymptomatic and bronchograms showed no residual bronchiectasis.

The fifth major complication was seen in a patient who had undergone right middle lobectomy. Severe abdominal pain, rigidity of the abdominal wall, pronounced leukocytosis, and inconclusive roentgenographic evidence suggestive of pneumoperitoneum developed on the second postoperative day. An exploratory laparotomy was performed with completely negative results. The patient's symptoms promptly subsided and he made an uneventful recovery. The pneumoperitoneum, if indeed one was actually present, did not recur and its cause was undetermined. This should perhaps more properly be classified as an error in diagnosis rather than as a major postoperative complication.

In this series the most significant minor postoperative complications were small bronchopleural fistulas or persistent parenchymal air leaks. We did not use needle aspiration in treating these fistulas, believing that a safer, quicker, and more certain method is to insert an intercostal catheter initially and apply suction. The 11 patients in whom a brief period of suction resulted in permanent cessation of the leak have been classified simply as late air leaks. Prolonged suction was required in 4 patients, and these have been listed under small fistulas. Pneumoperitoneum, with or without temporary phrenic nerve paralysis, has occasionally been used to assist in stopping a small air leak with gratifying results. We believe that judicious use of these measures will eliminate the necessity of reoperation in almost all patients with persistent bronchopleural fistula unless a major bronchial stump has reopened.

An especially important complication is atelectasis. In the critical early postoperative period this must be suspected in all patients who show roentgenographic evidence or physical signs of faulty aeration. Partial atelectasis occurred in 16 patients, 15 times on the operated side and once contralaterally. Intratracheal catheter aspiration, using the technic of Haight *(71)*, is usually carried out as an initial procedure and has frequently been found effective in relieving the atelectasis, perhaps due as much to stimulation of the cough mechanism as to direct aspiration of obstructive material. Repeated aspirations may be necessary. If, however, results of intratracheal suction are not apparent reasonably soon, a therapeutic bronchoscopy with aspiration is performed at the bedside of the patient. This is repeated as often as indicated and in our experience has never failed to give relief.

The basic cause of the atelectasis is usually the accumulation of thick tenacious secretions which the patient cannot raise. Certain medical measures may aid in prophylaxis. The intravenous

(71) Haight, C.: Intratracheal suction in management of postoperative pulmonary complications. Ann. Surg. 107: 218-228, Feb. 1938.

administration of sodium iodide has recently been proposed (72), but we have had no experience with this. We have found steam inhalations, with or without tincture of benzoin, of most benefit. We have not been impressed with the value of oxygen-carbon dioxide and believe that as much or more can be accomplished by encouraging voluntary deep breathing and coughing. Cough must be assisted as well as encouraged. Raising the patient to an upright position and supporting the chest on the operated side aids the patient greatly in coughing effectively. Drugs designed to thin and loosen secretions, such as ammonium chloride, may be of some value and they are used occasionally.

The use of sedation requires fine discrimination. The ideal is to give sufficient amounts to control pain so that the patient will not refrain from coughing, yet not enough to unduly dull the cough reflex. We usually give 50 mg. of demerol, p. r. n. only, for the first 2 postoperative days, and 65 mg. of codeine sulfate p. r. n. thereafter. Recently we have been injecting the intercostal nerves in the region of the incision with a long-acting anesthetic agent at the time of operation. We inject 5 cc. of efocaine solution at each site near the angles of the ribs. This anesthetizes the corresponding nerve as well as 2 above and 2 below it. Our preliminary impression is that the local block permits more effective coughing and diminishes the narcotic requirements. The greatest reliance, however, must be placed on mechanical measures. Once the presence of atelectasis is demonstrated or even suspected, the measures available for its relief must be used promptly.

Pleural effusion of variable degree and cause may follow excision, and it is important to determine whether it is sterile, contaminated with potentially pathogenic bacteria, or infected with purulent bacteria (empyema). In 18 patients in the present series, postoperative roentgenograms and fluoroscopy demonstrated an accumulation of pleural fluid on the side of operation. In 7 instances it was aspirated and found to be sterile. A moderate amount of fluid is to be expected following thoracotomy, and spontaneous absorption usually occurs. In cases in which the fluid is excessive in amount or persistent, however, thoracentesis should be performed or catheter drainage instituted. In the present series, prompt aspiration was the rule. Four patients developed pleural fluid which was not purulent but from which pathogenic bacteria were cultured. These are considered contaminated pleural effusions. In addition to the previously mentioned patient with extensive empyema for whom thoracotomy drainage with rib resection was necessary, 6 patients developed small but definite purulent effusions. All responded satisfactorily to closed intercostal catheter drainage and antibiotics.

(72) Baker, J. M.; Roettig, L. C.; and Curtis, G. M.: Prevention and treatment of atelectasis by control of bronchial secretions. Ann. Surg. 134: 641-652, Oct. 1951.

In addition to the previously discussed hemorrhages, 1 patient had a definite postoperative hemorrhage, which did not threaten life because there was prompt and satisfactory response to transfusions and other supportive measures. Complications referable to the operative wound were negligible. They consisted of a small subcutaneous abscess at the site of a thoracotomy tube, for which simple drainage proved effective; and a single superficial wound dehiscence involving skin and subcutaneous tissue only, for which secondary suture was satisfactory. In 1 patient, there were 2 episodes of pneumonitis on the unoperated side, for which antibiotic therapy proved effective. Contralateral spontaneous pneumothorax complicated the postoperative course of 1 patient. He was treated by suction via an intercostal catheter with good results. Three patients exhibited definite episodes of asthma postoperatively, for which no cause could be determined. Aminophylline given intravenously was uniformly successful in controlling the symptoms.

Subcutaneous emphysema of limited extent may be expected in a small percent of patients undergoing pulmonary resection. It is usually minimal and commonly recedes spontaneously. In one instance in this series it was so extensive and persistent that subcutaneous aspiration was considered advisable, although not urgently required. One previously normotensive patient exhibited a pronounced hypotension for a period of 1 week following operation. This was unrelated to surgical shock, but the possibility of a latent adrenal insufficiency activated by operation could not be excluded. Thrombophlebitis of the leg veins used for infusion occurred twice as a postoperative complication, but in each instance a conservative medical regimen proved satisfactory. Neither patient was given anticoagulants.

Complications referable to peripheral nerves were encountered on 3 occasions. In 2 instances a definite but incomplete radial nerve injury, due to faulty positioning of the patient on the operating table, became apparent immediately following operation. Gradual and complete recovery occurred spontaneously and was hastened by physiotherapy. The surgeon and anesthetist should be acutely aware of the possibility of peripheral nerve injury when positioning the patient for any intrathoracic operation, especially when the patient is heavy or the procedure apt to be unusually lengthy. Although no permanent disability resulted from the nerve injuries observed in these patients, the length of hospitalization was prolonged. On the tenth postoperative day 1 patient, who had undergone resection of the basal segments of the left lower lobe and of the lingula, noted the sudden onset of pain in his right upper extremity and right shoulder. Marked paresis of the extremity became evident within a short period. Physiotherapy and medical measures effected but slight improvement. Five months after

operation there was a persisting paresis of his serratus anterior, supraspinatus, infraspinatus, and deltoid muscles on the right and of his serratus anterior muscle on the left. This was probably an instance of the so-called neuralgic amyotrophy or shoulder-girdle syndrome described by Parsonage and Turner *(73)* with involvement of the long thoracic nerve, circumflex nerve, and fourth, fifth, and sixth cervical nerve roots on the right. The cause of the syndrome is not known and the only precipitating factor apparent in this patient was the operation.

In 3 patients in whom it was feared that a clotting hemothorax was interfering with effective suction through the thoracotomy tubes, a solution of streptokinase and streptodornase was instilled intrapleurally 48 hours after operation. A characteristic febrile response was noted and the use of the enzymes appeared to produce a definite increase in the amount of drainage. Carr and Robbins *(74)* stated that such early use of streptokinase and streptodornase might theoretically be expected to cause fresh bleeding by dissolution of protective clots. This complication had not been reported, however, and in the 3 patients mentioned there was no evidence of additional bleeding following the use of the enzymes.

Late postoperative complications have been gratifyingly few. Two patients developed what was considered to be homologous serum jaundice, but the diagnosis was not fully established and the jaundice soon cleared. The 2 patients who showed disease of the residual superior segment of the lower lobe have been discussed previously. We have no evidence to suggest that any other patients developed new areas of bronchiectatic involvement in previously healthy segments. Patients with bilateral disease who were awaiting operation on the second side at the time of writing were not yet free of symptoms of bronchiectasis. Most patients on whom an incomplete resection was deliberately performed have, as expected, persisting symptoms of some degree.

Left upper lobe cavitation and sputum positive for *Myco. tuberculosis* were demonstrated in a 19-year-old man 7 months after resection of the basilar segments of the left lower lobe and inferior segment of the lingula. The occurrence of clinical tuberculosis postoperatively in this patient is of interest with reference to the experience of Lambert *(75)*, who noted the development of pulmonary tuberculosis following resection for bronchiectasis in 10 patients (12.8 percent) of 78 who survived and were followed

(73) Parsonage, M. J., and Turner, J. W. A.: Neuralgic amyotrophy; the shoulder-girdle syndrome. Lancet 1: 973-978, June 26, 1948.

(74) Carr, D., and Robbins, S. C.: Streptokinase and antibiotics in treatment of clotted hemothorax. Ann. Surg. 133: 853-866, June 1951.

(75) Lambert, A.: Results of surgery in bronchiectasis. J. Thoracic Surg. 19: 246-256, Feb. 1950.

for an average of 4 years. Although the reasons for such an apparently high incidence are largely theoretical, the need for intensive preoperative screening to exclude the presence of tuberculosis is again stressed.

RESULTS

Of the 92 patients studied, 70 have completed the originally planned surgical treatment and have been followed for at least 6 months postoperatively so that the results are considered suitable for analysis. Chief reliance has been placed on measurement of daily sputum output before and after operation. Patients in whom sputum was absent or negligible postoperatively have been classified as having an excellent result. Those in whom sputum persisted but was less than one-fourth of the preoperative amount have been designated as having a good result. Not infrequently there is a favorable change in the character of the residual sputum in that it is thinner and less purulent. A reduction in the sputum by one-half was considered fair, and less favorable results poor. Patients in whom such outstanding symptoms as hemoptysis or recurrent pneumonic episodes were not significantly influenced by resection have also been classified as poor. When obtainable, the opinion of the patient regarding the efficacy of resection has been weighed. In the rare patient with no significant sputum preoperatively, reliance has been placed on the extent of bronchographic improvement following operation.

In the 70 patients followed for 6 months or more, the results are classified as excellent in 51 (73 percent), good in 12 (17 percent), fair in 4 (6 percent), and poor in 3 (4 percent). The results following right middle lobectomy were uniformly excellent because the disease was localized and amenable to complete removal. Unilateral resection of basal disease also produced gratifying results. The results following the pneumonectomies for total unilateral bronchiectasis have been most satisfying. In the 7 patients with bilateral resection, results have been excellent in 3 and good in 3. The remaining patient has not been followed long enough for accurate evaluation, but his functional status is satisfactory, he is symptom-free, and has been restored to full duty.

Although complete extirpation of diseased tissue is ideal, in patients with extensive involvement much is to be gained from a well-planned resection program, despite the necessity of retaining diseased areas. Thus, in 16 patients with significant residual disease, results were classified excellent in 5 (31 percent), good in 5 (31 percent), fair in 3 (19 percent), and poor in 3 (19 percent).

The ultimate goal is to restore the patient's ability to perform unrestricted physical activity. Among military personnel, there is no better measure of the degree to which this has been achieved

than the ability of patients to perform active duty following their operation. Our results in this respect are shown in table 5.

TABLE 5. *Disposition of active-duty personnel treated surgically for bronchiectasis**

Disposition	*Number*	*Percent*
Returned to full duty	50	68.50
Returned to limited duty	2	2.75
Still hospitalized	11	15.00
Deaths	2	2.75
Discharged by medical survey	8	11.00
With the diagnosis of bronchiectasis	(3)	(4.0)
For conditions other than bronchiectasis — Bronchial asthma (1), neuralgic amyotrophy (1), and pulmonary tuberculosis (3).	(5)	(7.0)
Total	73	100

*Although the nonservice personnel, including dependents and beneficiaries of the Veterans Administration, have been omitted from this table, the results in that group, comprising 19 patients, have been generally excellent. Each of those patients has been able to resume his or her usual occupation.

Of the 11 patients awaiting disposition, it is anticipated that all but 1 will be returned to full duty, increasing to 85 percent the number returned to duty. One patient who underwent right pneumonectomy for unilateral total bronchiectasis was given an 18-month trial of duty but was then surveyed from the Navy because of dyspnea on exertion and easy fatigability. Nevertheless, resection had given him marked symptomatic improvement.

SUMMARY AND CONCLUSIONS

One hundred successive resections for bronchiectasis were performed on 92 patients. Seven of these had bilateral operations and 1 had 2 resections on the right as well as 1 on the left. In the 70 patients followed for 6 months or more, the results were excellent in 73 percent, good in 17 percent, fair in 6 percent, and poor in 4 percent.

Complete bronchographic mapping of all lobes of each lung is a preoperative requisite when resection is contemplated. The results of excision vary directly with the degree to which extirpation of all diseased areas has been approached.

In 46 patients the basal segments of a lower lobe were resected with preservation of the superior segment. Of these, 33 were submitted to critical analysis. Only 3 showed bronchographic evidence of bronchiectasis developing postoperatively in the residual superior segment. This study suggests that preservation of a non-

bronchiectatic superior segment of a lower lobe in which removal of all the basal segments has been performed is a useful and justifiable procedure. The presence of endobronchial disease in the superior segment must be excluded prior to resection. Postoperative complications, such as atelectasis, must be prevented or vigorously treated if a healthy residual superior segment is to be assured.

Two deaths occurred in this series of 100 resections. One resulted from cardiac arrest and one was due to postoperative hemorrhage. Both are judged to have been preventable. Five major postoperative complications occurred. Prompt reoperation may be indicated in patients who show evidence of continued bleeding following resection. The most significant minor complications were small bronchopleural fistulas. Closure was obtained in all patients without resorting to direct surgical attack. Judicious use of pneumoperitoneum, with or without temporary phrenic nerve paralysis, will obviate the need for secondary surgical closure in almost all such patients with bronchopleural fistula. An especially important postoperative complication is atelectasis. Its satisfactory treatment demands early recognition and the energetic use of mechanical and other measures for its correction.

Excision continues to constitute the only curative treatment available for bronchiectasis. Medical therapy, nevertheless, is frequently of value in patients for whom resection is contraindicated or to whom a complete surgical program cannot be offered. The therapy for each patient must be individualized.

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PSYCHOTHERAPY WITH COMBAT FLIERS[1]

ROBERT J. LIFTON, *First Lieutenant, USAF (MC)* [2]

AIR Force combat personnel are carefully selected, well trained, and highly specialized. Most of the responsibility for their mental and physical health falls to their flight surgeon. Although in Korea air crewmen are a small percent of the forces engaged in active fighting, their morale, enthusiasm, and performance have generally been extremely high. This results from their training, their love of flying, strong group feeling, and the knowledge that there are a definite number of missions to be accomplished. I will consider these only as they relate to emotional problems encountered during combat missions.

Psychiatric difficulties among fliers in combat fall roughly into 3 categories: (1) anxiety reactions during early missions, (2) effects of undue external stress in the course of the combat tour, and (3) tension related to final 10 or 15 missions.

ANXIETY REACTIONS DURING EARLY MISSIONS

In the group of early anxiety reactions the flight surgeon frequently can be most effective. The initial adjustment that a combat pilot must make in Korea is not easy. Like everyone in Korea, he is in an undesirable location, living with few comforts, and far from his family. He may be a reservist who has flown a previous combat tour in World War II and resentful of again having to risk his life. He may be a former multiengine pilot, recently assigned to jets, who is not sure that he likes the change. He may be a fairly recent graduate of flying school who is apprehensive about being exposed to the "real thing." He may have mixed feelings about our war effort in Korea and, considering the small number of airmen being exposed to immediate danger, wonder why he out of so many was chosen for this task. Finally, there is the ever-present danger that he may be killed, injured, or captured by a savage enemy.

When an airman first arrives here and begins to take part in his training missions, he is likely to feel that he is an outsider. He is not yet part of the group whose members gather nightly at the

(1) From Lifton, R. J.: Psychotherapy with combat flying personnel. Far East Air Force Surgeon's News Letter No. 26.

(2) Headquarters, Fifth Air Force, San Francisco, Calif.

club to swap combat experiences. When he gets "checked out" in his aircraft and flies his first few missions, a dramatic change occurs. The situation that seemed so difficult has now been mastered. He has come through his baptism of fire and become a member of the "in-group." He can now look on new arrivals in a paternal fashion. He identifies himself strongly with his unit, enjoys its competition with other squadrons, and absorbs enough of its strength generally to enable him successfully to complete his combat tour without major emotional difficulties.

This conquest of initial fear and integration into the group does not always go so smoothly and it is quite common for pilots to experience anxiety symptoms of varying severity in this period. Some complain of nervousness, inability to sleep, poor appetite, and weight loss, or such somatic expressions as upper abdominal pain, general fatigue, blurfed vision, or low back pain. At this point, before an incapacitating neurotic or fear-of-flying syndrome has crystallized, sensitive and artful handling of the problem by the squadron's flight surgeon can pay the greatest dividends.

The confidence gained from successful completion of early missions and the ties developed usually allow the officer to free himself of his symptoms without medical aid. Many of the more aggressive pilots, because of their need for outward show of strength and independence, attempt to deny their fears and minimize their difficulties. If they seek help at all, it may be in the flight surgeon's quarters rather than in his office that they request a "pill" for their stomach or nerves. In these situations, a flight surgeon may do well to accept this attitude, dispense the palliative medication, and assume a casual but friendly manner. He should respect the patient's need to work out his own difficulties. This attitude of watchful waiting greatly benefits the patient through the recognition, perhaps unconscious, that he has a reliable professional person to whom he may turn should matters become worse. With a dependent or withdrawn flier, however, the flight surgeon must play a more active role.

Case 1. A 24-year-old jet fighter-bomber pilot, while engaged in precombat training missions, complained of pain in the ears aggravated by putting on his earphones. The flight surgeon examined him and made a diagnosis of external otitis. He believed that the patient was exaggerating his complaint, but grounded him for 2 days and successfully treated the condition. The patient then revealed that he also had blurred vision and, at the time of his annual physical, he asked for a "special eye check-up." When he was informed his eyes were not abnormal, he said, in a manner that did not convey a feeling of relief, "That was one physical that I did not expect to pass." He continued to make daily visits

to the flight surgeon, ostensibly for observation of his ears, and seemed to enjoy talking to his doctor. He at first discussed general topics but soon began to reveal the problems that were bothering him.

He was a volunteer and had recently completed his jet training, during which he had an accident after losing power on a take-off. Since that time, he experienced a marked fear on taking off. Later, when preparing for a training flight, he saw another jet have the same type of accident. This increased his apprehension. He had recently married and apparently felt insecure in his relationship with his wife. He had studied to be a commercial artist, but became discouraged when he did not meet with immediate success and decided to take up flying as a career.

He was an extremely dependent, overingratiating, but isolated person who did not seem to enjoy group activities. At least unconsciously, he sought grounds for medical disqualification but had a too highly developed conscience to be a malingerer. The approach used by the flight surgeon was to lend a "sympathetic ear." He encouraged the pilot freely to discuss his difficulties and reassured him that many others with similar problems were able to overcome them and fly effectively. He made himself readily available but wisely avoided the formation of the close social relationship which the pilot actively sought. At the time of writing, this officer had completed 6 combat missions. He was still "shaky" but somewhat less disturbed than originally. He continued to be fearful on take-off, but had relatively little anxiety over the target. After completion of each mission, he experienced marked fatigue.

Comment. This case illustrates the very common preoccupation with physical complaints as a reflection of anxiety. The pilot's personality difficulties predisposed him to this type of reaction and he felt like an outsider in his unit, unable to obtain or respond to the much-needed support of the group. Early recognition of the problem by the flight surgeon and prompt response to the patient's needs afforded moderate therapeutic success although the eventual outcome is uncertain.

Case 2. A 26-year-old B-26 pilot was noted to be frequently "aborting" his missions before take-off because of inconsequential but legitimate minor criticisms of the aircraft. He was also drinking fairly heavily. The flight surgeon noted that he was an aggressive, hostile person and was outspoken in his criticism of actions taken by a new commanding officer. His resistance to his missions reflected both his fear of combat and a passive-aggressive reaction to his resentment of the leadership in his unit.

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During an interview, the flight surgeon referred indirectly to the concept of fear of flying without specifically applying it to the existing situation. This resulted in a vehement denial of such a feeling by the pilot and the assertion that he would "show them all" and do his share and more. He performed well in subsequent missions, repressing his fear and rechannelizing his hostility. This hostility, which at first produced a negative attitude (in effect, "I won't fly for you"), was later used to stimulate his performance in combat. The underlying feeling then was, "You say I'm afraid. Well now I'll show you that I'm not."

Comment. This type of indirect challenge can be effective but should be used discriminatingly and only when the patient has sufficient ego strength to withstand it. A safer and more generally applicable approach is the frank discussion of the physical and emotional effects of anxiety, its occurrence as a normal reaction to marked stress, and its value in maintaining the alertness of the pilot. Great emphasis has always been placed by military authorities on the value of courage and the undesirability of fear. It is important for the flight surgeon to help to remove the stigma of cowardice and thus alleviate the strong guilt feelings that generally accompany these fear reactions.

EXTERNAL STRESS DURING COMBAT TOUR

The effects of undue external stress during a tour of combat duty include the most difficult group of conditions to treat. The external stress is most frequently, directly or indirectly, a result of combat and may involve either the patient or other members of his unit. Personality difficulties are predisposing factors, but the disabling psychiatric symptoms are related to and frequently precipitated by a particular accident, injury, or series of harrowing experiences.

Case 3. A 24-year-old navigator manifested signs of moderate anxiety during his B-26 night missions. He had done some reading in psychology and at times attempted to discuss his difficulties in technical terms. During his sixth mission, his plane received moderate damage from enemy fire. He was visibly shaken up but continued to fly. After returning from his next mission, which was particularly difficult, he awakened his flight surgeon at 0330 hours. He was markedly agitated and said that he had "just curled up in a fetal position" and urinated in his bed. He was feeling extremely disturbed, could not sleep, and feared that he was going crazy. He expressed the belief that some disease was "eating out his brain," and presented the findings of an acute psychotic reaction. The flight surgeon reassured him and sedated him heavily. On the following morning he had improved dramatically and showed only mild anxiety. In a few days he was medically cleared to fly. At the time of writing, he had completed 22 missions, was getting along well, and had received a commendation.

Comment. In this case the flight surgeon made a diagnosis of acute dissociative reaction rather than that of psychosis. The general findings, including acute onset, severe symptoms, and quick recovery, resembled those of patients with acute anxiety seen during infantry combat. This patient probably had some underlying schizoid traits and the situation was further complicated by his reading psychologic literature. Had he been grounded for a longer period, it is likely that a more structured neurotic or fear pattern would have developed. It is not always possible to return patients of this type to flying duty but it is important to make an early decision with the help of a psychiatric consultation, if indicated.

Case 4. A 29-year-old married jet pilot flew 35 fighter-bomber missions during a period when his unit was undergoing significant casualties. Two of his close friends were lost within a brief period, one while flying a mission with him. Immediately after this he began to experience great anxiety in the form of insomnia, loss of weight, and anorexia. He became sullen, kept to himself, and decided to request administrative relief on the basis of fear of flying. During the period while he was weighing this decision, he became increasingly tense and seclusive. While on a short leave of absence, he contracted gonorrhea. He felt extreme guilt and cried bitterly when he came to the flight surgeon for treatment. He had previously been considered a superior pilot and a mature, intelligent person who was extremely popular in his squadron. When he requested grounding, he felt greatly relieved and his symptoms of anxiety disappeared. He became clinically well but would no longer go near his airplane. He felt that any administrative action taken against him would be preferable to flying again.

Comment. This type of reaction, with predominant feelings of anxiety and guilt following the loss of a person with whom the patient has had either a dependent or ambivalent relationship, is commonly encountered in ground fighting. Symptoms were present as long as the conflict existed between his group loyalties and his developing fear of combat flying and abated once this was resolved by his decision to quit.

Case 5. A 27-year-old jet pilot had a major aircraft accident not directly attributable to enemy action while on a fighter-bomber combat tour. He sustained only minor injuries but was shaken up by the incident. He was extremely anxious to get back into combat. His request was soon granted but it was noted that his previous calm was now replaced by a markedly aggressive attitude toward the enemy.

Comment. His exaggerated desire to get back into combat immediately and his verbal hostility directed toward the enemy

were attempts to cloak his anxiety and fear. As the flight surgeon aptly said, "It was like a man who had been thrown from a horse insisting that he get back on." There was a tacit recognition by the flight surgeon (and perhaps unconsciously by the patient) that if he had not resumed flying immediately, he might never have been able to have done so. He was able to perform well on subsequent missions, and prolonged grounding might have been harmful.

In Korea, our experience has been that enforced idleness is an external factor much more damaging to morale than enemy activity. This may occur because of bad weather or when more pilots than planes are available. Most pilots are anxious to complete their missions and get home quickly. When grounded by poor flying weather for any length of time, they fear loss of their "sharp edge" and fear getting "stale." The flight surgeon is powerless to influence these factors but should be on the lookout for beginning evidence of emotional disorders during these periods.

EMOTIONAL TENSION DURING FINAL MISSIONS

Mild to moderate nervousness, irritability, or increased drinking in the course of the final 10 or 15 missions are almost universal occurrences, but rarely cause clinical concern. Behavior may range from mild unsteadiness to near psychosis during a period which officially begins when a flier receives his orders to rotate from the combat zone but signs may appear a month or more preceding this. The condition represents a combination of elation at the imminent prospect of getting away from an unpleasant situation, the unrestrained joy of returning home, and the feeling that something may happen at the last minute to prevent its realization. This reaction is understandably intensified in the combat pilot who fears specifically that he will be shot down during one of his final missions. The policy of requiring the completion of a definite number of missions is the all-important factor which enables him to get through this difficult period.

Case 6. A 28-year-old B-26 pilot successfully completed 53 missions without serious incident and was designated for rotation within 30 days. Although, according to existing unofficial policy, he did not anticipate flying any more missions, a directive was issued requiring all combat fliers to complete 55 missions before leaving the theater. He became markedly anxious and depressed, had frequent crying spells, and insisted that he was unable to fly any. He was finally permitted to rotate without being forced to do so.

Comment. When these late, untoward reactions occur in severe form, commanding officers usually take cognizance of the amount of combat already completed, and flight surgeons are apt to meet

with success in their attempts to have a pilot rotated from the theater.

DISCUSSION

A generally unrecognized factor in the prerotation jitters, which many experience, is the reluctance to leave Korea. Among fliers there sometimes develops such satisfying group identities, enjoyment of their work and, in some cases, freedom from family responsibility, that anxiety and conflict are experienced at the thought of returning to problems left behind. These may be factors in the occasicnal flier who extends his tour to fly additional missions.

In these case histories the symptoms observed in most patients in all 3 groups are either of the anxiety or phobic variety, or of somatic preoccupation. The phobic symptoms often express the dramatic reversal of a pilot's feeling toward his plane from that of almost sensual love to complete fear and the need for avoidance *(3)*. One of the emotional satisfactions derived from flying is the feeling of power and omnipotence it affords. A related mechanism in combat is used to deny anxiety, and is expressed by the nothing-can-happen-to-me attitude. Frequently, identification with a friend who has been shot down occurs in response to stress, and the complete reversal occurs as the feeling that "some disaster must happen to me." Once this phobia has fully developed, it is extremely difficult to induce a crew member to resume flying.

Anxiety is quickly diminished when the patient is relieved from combat flying *(2)* but he is rarely able again to become an effective pilot. We have observed in Korea virtually none of the severe cases described in World War II with the occurrence of diffuse, overwhelming phobias and sustained regressed behavior. I believe that the profound reactions previously encountered reflected the more prolonged missions, greater resistance by enemy fighters and flak, and heavier personnel losses. The most satisfactory results can be obtained from early recognition and treatment of these problems before they become full-blown and incapacitating. This task falls within the province of the unit flight surgeon, who is most closely associated with fliers in everyday living. No single technic can be universally applied, and the emphasis must always be on the most effective approach to the patient. I believe, however, that an alert flight surgeon can be as effective as a consulting psychiatrist. He is sometimes in a better position to achieve results because of his standing in the squadron. In the more severe cases, no therapy is efficacious

(3) Bond, D. D.: Love and Fear of Flying. International Universities Press, Inc., New York, N. Y., 1952.

until the patient is removed from the stress of combat. What is frequently helpful is an informal discussion between the flight surgeon involved and the psychiatrist of methods of approach during the early phases of a problem. Medical and surgical consultations should be obtained when doubt exists and there is a definite indication for them; but if an entity is clearly recognizable as a somatic preoccupation because of underlying emotional conflict, these consultations may serve as a means of fixing the particular symptom. This possibility should be recognized and consultations should not be used merely as means of postponing a decision.

The flight surgeon can play an equally important role in preventing psychiatric difficulties by doing all he can to improve group identities and squadron morale. The routine contacts he makes in the messhall, barracks, or flight line, as well as in his office, can all be used as a barometer of group feeling and a means of strengthening his relationship with the men. He must give freely of himself and exhibit less reserve than is customary in many branches of military medicine; yet he must avoid the pitfall of loss of objectivity through overidentification with the men of the unit. He must realize that his job is medical care in which he makes decisions to the best of his skill and experience. He is not responsible for the fact that men must kill and themselves risk death. The feeling that a flight surgeon recently expressed to me illustrates this clearly. He said, "I have a patient whom I can't get off (the ground). If he were to be killed, I'd feel responsible." This is certainly an understandable human reaction, but recognizing its illogical content is helpful in making objective medical decisions as indicated. Another flight surgeon recently gave the most meaningful description I have heard of what he did in his squadron. He compared his work to that of a general practitioner, adding, "I'm a half preacher, half doctor, and half psychiatrist, trouble shooter, and general good fellow."

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The Human Senses, by *Frank A. Geldard,* Professor of Psychology, University of Virginia. 365 pages; illustrated. John Wiley & Sons, Inc., New York, N. Y., publishers, 1953. Price $5.

The Principles of Neurological Surgery, by *Loyal Davis,* M. S., M. D., Ph. D., D. Sc. (Hon.), Professor of Surgery and Chairman of the Division of Surgery, Northwestern University Medical School, Chicago, Ill. 4th edition. 544 pages; illustrated. Lea & Febiger, Philadelphia, Pa., publishers, 1953.

PAINLESS MYOCARDIAL INFARCTION

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AMONG the earliest clinically recognized cases of myocardial infarction, the presence of intense, persistent, substernal or epigastric pain was considered to be a typical feature. More recent observations, however, have shown that this type of pain may be simulated by other acute disorders, and also that acute infarction of the myocardium may occur without pain in a limited number of patients. In this latter atypical group, other related symptoms suggesting cardiorespiratory failure, cerebral disturbance, or gastrointestinal upset usually predominate. The number of such cases labeled as painless, silent, or atypical cardiac infarction encountered has depended somewhat on the definition of the term painless as well as on the care taken in eliciting the patient's history. Sensations reported as "substernal discomfort" or "precordial distress," although mild or vaguely described, often have not been considered as actual pain. In spite of the established fact that painless cardiac infarction occurs, some uncertainty as to the cause and incidence of this condition remains.

The first comprehensive work on this subject in America was published by Herrick *(2)*. In more recent studies, attempts have been made to determine the relative frequency of painless and painful attacks. The varying incidence of painless cases as reported in the literature from 1940 to date is summarized in table 1.

Several hypotheses have been offered to explain the occurrence of myocardial infarction without pain. Blumgart et al. *(15)* demonstrated by clinical and pathologic studies that the presence or absence of cardiac pain and myocardial damage depends on the development of sufficient collateral circulation to keep pace with coronary artery narrowing. Dye injection studies in cadavers showed that about one-third of those over 40 years of age at the time of death had a complete occlusion or

(1) U. S. Naval Hospital, National Naval Medical Center, Bethesda, Md., at time of writing; now with Military Sea Transportation Service, Atlantic Area, Brooklyn, N. Y.

(2) Herrick, J. B.: Clinical features of sudden obstruction of the coronary arteries. J. A. M. A. 59: 2015-2017, Dec. 7, 1912.

TABLE 1. *Studies on myocardial infarction*

Authors	Year	Number of patients	Percent without pain	Remarks
Pollard and Harvill (3)	1940	375	8.5	Four percent of the painless group were not positive for infarction by ECG
Stroud and Wagner (4)	1941	49	26.5	Clinicopathologic study
Levine and Rosenbaum (5)	1941	208	3.0	
Stroud and Wagner (6)	1942	100	15.0	These patients not reported in (4)
Baer and Frankel (7)	1944	378	10.0	Clinical study over 12-year period
Kugel (8)	1945	350	2.9	
Fisher and Zukerman (9)	1946	108	14.8	
Chambers (10)	1946	100	21.0	
Mintz and Katz (11)	1947	572	3.2	Of these 18 patients without pain, 5 died
Landman et al. (12)	1949	255	11.0	Of these 28 "asymptomatic" patients, 15 had recent and 13, clinically old infarctions
Behrmann et al. (13)	1950	150	7.3	All 11 of these patients without pain died
Warner (14)	1951	200	7.5	Of these 15 patients 7 had no pain and 8 had atypical symptoms
Present study	1952	136	7.3	

marked narrowing of one or more major coronary arteries. This occurred despite their apparent freedom from cardiac pain during life. The site and relative importance of the vessel or vessels occluded and the rate and extent of development of the resulting injury were also important modifying factors in the production of pain. White *(16)* asserted that "if coronary narrowing and obstruction and even cardiac infarction develop slowly * * * there may be no symptoms at all though there be extensive areas of damaged muscle and though one or both coronary arteries be occluded."

Levy *(17)* suggested that symptoms other than pain in cardiac infarction may be "pain equivalents." In this instance the sympathetic C fibers may be abnormal in their response to stimulation by anoxia. Other possibilities include the presence of an atypical coronary innervation or the alteration of a regular nervous distribution by disease so that normal response does not occur. Herrick *(18)* plausibly summed up this occasional absence of pain by suggesting that (1) certain areas of the heart might be less sensitive to pain than others and, (2) a gradual arterial

(3) Pollard, H. M., and Harvill, T. H.: Painless myocardial infarction. Am. J. M. Sc. 199: 628-635, May 1940.

(4) Stroud, W. D., and Wagner, J. A.: Silent or atypical coronary occlusion. Ann. Int. Med. 15: 25-32, July 1941.

(5) Levine, S. A., and Rosenbaum, F. F.: Prognostic value of various clinical and electrocardiographic features of acute myocardial infarction; immediate prognosis. Arch. Int. Med. 68: 913-944, Nov. 1941.

(6) Stroud, W. D., and Wagner, J. A.: Painless myocardial infarction. Pennsylvania M. J. 45: 590-593, Mar. 1942.

(7) Baer, S., and Frankel, H.: Studies in acute myocardial infarction. Ann. Int. Med. 20: 108-119, Jan. 1944.

(8) Kugel, M. A.: Clinical significance of pain in acute coronary occlusion with myocardial infarction. J. Mt. Sinai Hosp. 12: 422-439, May-June 1945.

(9) Fisher, R. L., and Zukerman, M.: Coronary thrombosis. J. A. M. A. 131: 385-393, June 1. 1946.

(10) Chambers, W. N.: Acute myocardial infarction; study of 100 consecutive cases. New England J. Med. 235: 347-352, Sept. 12, 1946.

(11) Mintz, S. S., and Katz, L. N.: Recent myocardial infarction; analysis of 572 cases. Arch. Int. Med. 80: 205-236, Aug. 1947.

(12) Landman, M. E.; Anhalt, H. S.; and Angrist, A.: Asymptomatic myocardial infarction. Arch. Int. Med. 83: 665-676, June 1949.

(13) Behrmann, J. H.; Hipp, H. R.; and Heyer, H. E.: Pain patterns in acute myocardial infarction. Am. J. Med. 9: 156-163, Aug. 1950.

(14) Warner, H. R.: "Painless" myocardial infarction. Minnesota Med. 34: 49-50, Jan. 1951.

(15) Blumgart, H. L.; Schlesinger, M. J.; and Zoll, P. M.: Angina pectoris, coronary failure and acute myocardial infarction; role of coronary occlusions and collateral circulation. J. A. M. A. 116: 91-97, Jan. 11, 1941.

(16) White, P. D.: Heart Disease. 3d edition. Macmillan Co., New York, N. Y., 1944. p. 487.

(17) Levy, R. L.: The Diagnosis and Treatment of Cardiovascular Disease. F. A. Davis Co., Philadelphia, Pa., 1940. p. 431.

(18) Herrick, J. B.: Coronary artery in health and disease (Harvey lecture). Am. Heart J. 6: 589-607, June 1931.

narrowing by sclerosis possibly caused anesthesia in the region it supplied by slowly destroying local blood vessels, nerves, and muscular tissue. Following the latter event, a final complete obstruction could occur without a sudden shock—the heart being somewhat prepared beforehand for the ensuing infarction.

ANALYSIS OF SERIES

The present study was made to determine the incidence of painless cardiac infarction at the U. S. Naval Hospital, Bethesda, Md., in the past 5 years. All clinical records for this period in which infarction of the myocardium appeared among the final diagnoses were reviewed. This series was limited, however, to patients in whom acute infarction had occurred. Such diagnoses were established from the clinical histories, serial ECG's, and available necropsy material.

TABLE 2. *Incidence of symptoms in 10 patients with painless infarction**

Symptom	*Number of patients*
Generalized weakness	4
Dyspnea Mild (3) Severe (2)	5
Palpitation (arrhythmia)	3
Abdominal discomfort	2
Syncope	2
Nausea	1
Vertigo	1

*In some instances 2 or more of the above symptoms coexisted in 1 patient.

This study includes 136 patients with definite myocardial infarction, 10 of whom had no definite anginal pain. The average age of these atypical patients was 51 years. The incidence of prominent symptoms in the 10 patients is shown in table 2 and other data on these patients are shown in table 3.

In the 126 patients in whom pain was a prominent symptom, there were 37 deaths. Necropsy was performed on 27. The average age was 55 years (range 23 to 81). The sex distribution was 111 men and 15 women. Nine of the total number were Negroes. Forty-two gave a history of hypertension. The location of infarction was anterior, anterolateral, or anteroseptal in 81; posterior, posterolateral, or posteroseptal in 40; and combined anterior-posterior in 5 patients.

TABLE 3. *Summary of records of 10 patients with painless myocardial infarction*

Patient	Age (years)	Sex	Race	Related disease	Chief symptoms	Location of infarction	Survival	Necropsy
1	37	M	W	Thromboangiitis obliterans of 1-year duration	None referable to infarction	Anterior	+	−
2	41	M	W	Subacute bacterial endocarditis 2 yr. earlier with recovery	Weakness, dyspnea, and palpitation	Anterior	+	−
3	41	M	W		Vertigo and syncope	Anterior	+	−
4	46	M	W		Weakness and muscular aching in arms	Posterior	+	−
5	46	M	W		Nervousness and discomfort in upper chest	Antero-lateral	+	−
6	52	M	N	Hypertension of 12-year duration and arteriosclerotic cardiovascular disease with congestive heart failure	Dyspnea and orthopnea	Anterior	−	−
7	60	M	W		Lower abdominal discomfort	Antero-septal	+	−
8	60	M	W	Diabetes mellitus of 10-year duration	Dyspnea	Anterior	−	−
9	67	M	W	Thrombophlebitis (femoral)	Weakness, dyspnea, syncope, and palpitation	Posterior	+	+
10	72	M	W	Hypertension of 7-year duration, cerebrovascular accident, and hemiparesis	Weakness, dyspnea, nausea, and abdominal discomfort	Posterior	+	−

On comparing those in whom pain was present with those in whom pain was absent, no marked discrepancies were evident between the groups as to age, sex, race, location of infarction, complications, or mortality while in the hospital. Precipitating factors and seasonal incidence likewise did not vary widely. The presence of diseases predisposing the patient to cardiovascular damage appeared somewhat more frequent, however, in the group without pain.

DISCUSSION

A comparison of the incidence of painless infarctions in the present study with that of other *recent* reports shows a close correlation (table 1). Boas and Boas *(19)* stated that "if one includes the lesser forms of distress such as mild constriction or uneasiness of the chest as manifestations of pain, and it seems logical to do so, it is found that myocardial infarction is unaccompanied by pain in at most 5-10 percent of cases." It is probable that cases without pain often have escaped detection or have been misdiagnosed in the past. The increasing number reported in recent years has been proportional to an augmented interest in their detection. From a therapeutic standpoint it is important to recognize these painless cases. Blumgart *(20)* has summarized their clinical findings as follows: "In approximately 10 percent of attacks of acute myocardial infarction, pain is absent. Intense or moderate dyspnea, weakness and, occasionally, acute pulmonary edema occupy the foreground of the clinical picture. In some persons who experience no cardiac pain the onset * * * is signalled by syncope and collapse. Acute myocardial infarction may develop without being evidenced by pain in any patient in whom the sensorium is clouded by diabetic coma, uremia, advanced congestive failure or hemiplegia. In such instances, unexplained fever, leukocytosis, the onset of dyspnea or cardiac irregularity may provide the clue and lead to electrocardiographic studies to confirm the diagnosis."

Vague clinical findings or objective evidence of cardiac infarction other than pain should cause the physician to suspect this possibility. Bed rest should be prescribed and serial ECG's obtained in all such patients. By early recognition and adequate treatment, morbidity and mortality in these patients may be significantly reduced.

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(19) Boas, E. P., and Boas, N. F.: Coronary Artery Disease. Year Book Publishers, Inc., Chicago, Ill., 1949. p. 225.

(20) Blumgart, H. L.: Diseases of the coronary arteries. In Cecil, R. L., and Loeb, R. F. (editors): A Textbook of Medicine. 8th edition. W. B. Saunders Co., Philadelphia, Pa., 1951. p. 1138.

CONCLUSIONS

Pain is absent in from 5 to 10 percent of all patients with myocardial infarction. Other symptoms such as dyspnea and weakness may appear in lieu of pain. Patients with painless infarction have a high incidence of disorders contributory to, or complicating, coronary heart disease. The early recognition and proper treatment of these patients is important.

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Familial Nonreaginic Food-Allergy, by *Arthur F. Coca,* M. D., Oradell, N. J., with contributions by *Conrad Berens,* M. D., New York, N. Y.; *Edith L. Cumming,* Valley Cottage, N. Y.; *Louis J. Girard,* M. D., New York, N. Y.; *Leonard S. Green,* L. L. B., New York, N. Y.; *Alan Johnston,* M. D., Plainfield, Ind.; *Arthur P. Locke,* Ph. D., New Brunswick, N. J.; *Milo G. Meyer,* M. D., Michigan City, Ind.; *M. Murray Peshkin,* M. D. New York, N. Y.; and *Sumner Price,* M. D., Honolulu, T. H. 3d edition. 279 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1953. Price $10.50.

Practical Clinical Chemistry, A Guide for Technicians, by *Alma Hiller,* Ph. D., Associate Attending Biochemist in Charge of Clinical Chemistry, Presbyterian Hospital of the City of Chicago; Associate Professor of Biological Chemistry, University of Illinois College of Medicine, Chicago, Ill. 266 pages. Charles C Thomas, Publisher, Springfield, Ill., 1953. Price $6.50.

Year Book of Eye, Ear, Nose and Throat (October 1951-September 1952). The Eye, edited by *Derrick Vail,* B. A., M. D., D. Oph. (Oxon.), F. A. C. S., F. R. C. S. (Hon.), Professor and Director, Department of Ophthalmology, Northwestern University Medical School; Attending Ophthalmologist, Passavant Memorial Hospital; Past Attending Ophthalmologist, Cook County Hospital. The Ear, Nose and Throat, edited by *John R. Lindsay,* M. D., Professor of Otolaryngology, University of Chicago, The School of Medicine. 455 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1953. Price $6.

The Anatomy of the Nervous System, Its Development and Function, by *Stephen Walter Ranson,* M. D., Ph. D., Late Professor of Neurology and Director of Neurological Institute, Northwestern University Medical School, Chicago, Ill. Revised by *Sam Lillard Clark,* M. D., Ph. D., Professor of Anatomy, Vanderbilt University School of Medicine, Nashville. 9th edition. 581 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publishers, 1953.

Direct Analysis Selected Papers, by *John N. Rosen,* M. D. 184 pages. Grune & Stratton, New York, N. Y., publishers, 1953. Price $3.75.

The Anatomy of the Domestic Animals, by *Septimus Sisson,* S. B., V. S., D. V. Sc., Late Professor of Comparative Anatomy in the Ohio State University, Columbus, Ohio; Member of the American Association of Anatomists; Fellow of the American Association for the Advancement of Science. Revised by *James Daniels Grossman,* G. PH., D. V. M., Professor of Veterinary Anatomy in the College of Veterinary Medicine, Ohio State University, Columbus, Ohio. 4th edition, revised. 972 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publishers, 1953.

Clinical Periodontology, The Periodontium in Health and Disease, Recognition, Diagnosis, and Treatment of Periodontal Disease in the Practice of General Dentistry, by *Irving Glickman,* B. S., D. M. D., F. A. C. D., Professor of Oral Pathology and Periodontology and Director of the Division of Graduate and Postgraduate Studies, Tufts College Dental School; Associate Staff (Stomatology), New England Center Hospital; Consultant in Periodontology, Forsyth Dental Infirmary for Children; Lecturer in Oral Pathology, Boston University School of Medicine, Boston, Mass. 1,019 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publishers, 1953.

A Manual of Clinical Allergy, by *John M. Sheldon,* M. D., Professor of Internal Medicine, University of Michigan Medical School; Assistant to the Chairman of the Department of Postgraduate Medicine; Physician in Charge of University of Michigan Allergy Clinics; Director of the Montgomery Allergy Research Laboratory; *Robert G. Lovell,* M. D., Instructor in Internal Medicine, University of Michigan Medical School, and *Kenneth P. Mathews,* M. D., Assistant Professor of Internal Medicine, University of Michigan Medical School. 413 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publishers, 1953.

American Pocket Medical Dictionary, A Dictionary of the Principal Terms Used in Medicine, Nursing, Pharmacy, Dentistry, Veterinary Science, and Allied Biological Subjects. 19th edition. 639 pages. W. B. Saunders Co., Philadelphia, Pa., publishers, 1953.

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Visual Anatomy: Thorax and Abdomen, by *Sydney M. Friedman,* M. D., Ph. D., Professor of Anatomy, University of British Columbia, Vancouver, Canada; Formerly, Associate Professor of Anatomy, McGill University, Montreal, Canada. 203 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1952. Price $10.50.

THE BACTERIOLOGIC DIAGNOSIS OF ENTERIC INFECTIONS[1] [2]

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ENTERIC infections are a continuing and often a major problem in the Armed Forces. They may involve our own troops, particularly in countries where enteric infections are highly endemic. Outbreaks in units of the Pacific Fleet have been disturbingly common. Furthermore, the responsibility of our medical services extends to prisoners of war, civilian refugees, and, at times, to entire civilian populations. Allied troops of other nationalities whose medical facilities are less adequate may need assistance. Thus the bacteriologic diagnosis of enteric infections is of great importance in Armed Forces laboratories.

The best diagnostic facilities for enteric infections are those which are readily available, are capable of handling large numbers of examinations, and can provide dependable findings as quickly as possible. Large central diagnostic laboratories ordinarily cannot meet these requirements. The outbreak and the need is usually far removed from them. In the interest of effective control, the initial work must be done in the smaller laboratories which are close to the problem. An expert bacteriologist is rarely available in such a laboratory and the work falls necessarily to technicians.

Reference texts and monographs cover exhaustively those aspects of the bacteriology of the enteric pathogens which are of particular interest to senior workers. We are offering here an out-

(1) The studies here reported were conducted in Korea by a Joint Dysentery Unit under the sponsorship of the Commission on Enteric Infections of the Armed Forces Epidemiological Board. Those participating in the study in Korea came from the Army Medical Service Graduate School, the Fleet Epidemic Disease Control Unit No. 1, the Microbiological Institute and Communicable Disease Center of the U. S. Public Health Service, the 406th (U. S. Army) Medical General Laboratory, the 64th Field Hospital, the Bureau of Laboratories of the Florida State Board of Health and Louisiana State University School of Medicine.

(2) Methodology studies of rapid technics were supported by a grant from the School of Aviation Medicine.

(3) Director of Laboratories, Florida State Board of Health.
(4) 406th Medical General Laboratory.
(5) Department of Microbiology, School of Aviation Medicine, Randolph Field, Tex.

line of technics designed to serve as a practical guide for studies in the field, for smaller laboratories, and for workers of more limited experience with these organisms. The technics described were evolved in part through comparative studies in a Public Health Laboratory and, in part, through experience in the study and control of an extensive outbreak of enteric infections in Korea. Alternative procedures are available, but we describe only the technics believed best for other than widely experienced bacteriologists.

THE SPECIMENS

Shipped fecal specimens can be considered as satisfactory only in examinations for salmonella infections. There is no preserving fluid or shipping medium which will provide dependable findings for shigellosis. Cultures for these must be made on fresh specimens. These may be obtained as follows:

Passed specimens. In hospital practice, the patient may be provided with a sterile bedpan, or an appropriate substitute (locally manufactured, small, tin, hand washbasins were used in Korea). The whole specimen should be taken to the laboratory immediately and should be cultured *within minutes* of passage. With delay, the findings become progressively less reliable.

Rectal swabs. The materials used for this technic consist of latex rubber tubing (0.5 cm. inside and 0.8 cm. outside diameter) cut into 12-cm. lengths with a 1-cm. bevel at one end and cotton-tipped applicators (with the cotton wound tightly and completely covering the tip). The latter must pass easily through the rubber tube. After sterilization, the swab is placed in the rubber tube with the cotton tip about 0.5 cm. proximal to the opening of the beveled end. The external surface of the terminal tip of the tube is lubricated with a sterile nonbacteriostatic lubricant. Care is taken to prevent the lubricating jelly from reaching the swab or covering the opening. The ambulatory patient is instructed to bend over and hold the buttocks apart. With the patient in this position, the unit is inserted about 6 cm. The end of the swab is exposed by withdrawing the tube 2 or 3 cm. To collect the specimen the swab is rotated as the tube is swept in a circular motion. The tube and swab are then removed and separated. The swab is used for direct inoculation of plates and enrichment as described. The tubes are boiled and washed, then resterilized for future use.

The only purpose of the lubricated rubber tube is to facilitate the insertion of the cotton-tipped swab well beyond the anal sphincter. In the young, the sphincter is very relaxed and the swab alone is satisfactory for infants. In adults, the swab without the rubber may be used with the exercise of extra care on the part of the person taking the specimens and after some practice.

The buttocks must be held widely apart, exposing and partly opening the anus. The swab is inserted with gentle pressure and simultaneous rotation. The material for culture is collected as above. On withdrawing, rotation in the same direction is continued, thus avoiding the unwinding of the cotton and loss of the swab. Mastery of this technic saves the labor of preparing, washing, and sterilizing the rubber tubes.

The major advantage of the rectal-swab technic is that specimens may be obtained as desired. Two workers can culture from 100 to 150 persons per hour. The men line up, drop their trousers, bend over, and hold the buttocks apart. One worker takes the swabs and hands them to a second who inoculates prenumbered plates. An assistant records the names and corresponding laboratory numbers.

Sigmoidoscopic swabs. Sigmoidoscopic examinations, when performed, permit collection of swabs from areas of maximum involvement in the lower bowel. Material from this source, if it can be obtained, is somewhat superior for culture purposes.

If it is necessary to submit *specimens by mail* (or courier), a 1-ounce screw-capped bottle, half filled with a 30 percent buffered glycerine-saline solution, is satisfactory only for the diagnosis of *Salmonella typhosa* and other salmonella infections.

The relative reliability of cultures for shigella on freshly passed feces, material collected by rectal swab, and that obtained at sigmoidoscopic examination has been evaluated and the findings reported *(6)*. The latter yielded about 6 positive cultures as compared with 5 obtained from freshly passed feces. Material collected by rectal swabs gave a few more positives than the cultures on passed specimens. On the basis of convenience and reliability the rectal-swab technic may be used with confidence.

MEDIA FOR PLATING AND ENRICHMENT

Select the best media and use the least number of plates that will give dependable results. The media recommended include:

Shigella-salmonella agar (SS). This is the most valuable and reliable single-plating medium available for enteric cultures. All common shigella, all salmonella, the paracolons, and also a variety of organisms which are generally considered nonpathogens, such as pseudomonas, proteus and alcaligenes, grow well on this medium. It may inhibit some rarely occurring strains such as *Shigella dysenteriae* (Shiga).

(6) Hardy, A. V.; Mackel, D.; Frazier, D.; and Hamerick, D.: Relative efficacy of cultures for shigella. U. S. Armed Forces M. J. 4: 393-394, Mar. 1953.

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MacConkey's or *desoxycholate agar* may be used as additional plating media for the isolation of shigella which do not grow on SS agar. They are less selective than SS. There is limited need for these as initial plating media, but their use is indicated when plating cultures for purity.

Wilson-Blair's bismuth sulfite agar (WB) is highly selective for salmonella and has outstanding value for the isolation of *S. typhosa*. Its use is indicated in a search for typhoid cases or carriers.

Kauffmann's *brilliant green agar* (BG) is also highly selective for most salmonella other than *S. typhosa* and *Salmonella paratyphi A*.

Enrichment broth for salmonella. Tetrathionate and selenite F are both recommended. Most workers add brilliant green to the tetrathionate (1 ml. of a 1:1000 solution per 100 ml. medium). The selenite F in dehydrated form may deteriorate. When prepared it should be a light straw color; if amber, discard. The inoculated enrichment broth is incubated for about 18 hours; subcultures are transferred to SS or to the more highly selective media (WB or BG) mentioned above.

These media and the differential Kligler's iron agar (KIA) referred to below are all available in dehydrated form. Prepare according to directions. The addition of 1 percent sucrose to the KIA will provide a triple sugar medium and is recommended. Dehydrated media are satisfactory to use if, in the bottle, they are finely granular. When "caked" into a firm mass they may produce irregular results and should be discarded.

Select media according to needs. SS alone is indicated as the plating medium for most cases or outbreaks of shigellosis. If the nature of the outbreak or the probable diagnosis of the patient is not known, plate directly to SS and inoculate an enrichment broth. If typhoid is suspected, plate to WB also. It is sound practice to use multiple media in a situation of unknown nature and to continue to use only those which yield a substantially higher number of positives than the others.

PLATING OF SPECIMENS

Direct inoculation of all plates is done with swabs. With fresh, whole, fecal specimens a sterile swab is dipped into the mucopurulent exudate if any is present, or into the feces if there is no exudate. Specimens in glycerin and saline are shaken gently and the fresh swab is dipped into the mixture.

The swab obtained by any of the methods described is used to inoculate an SS plate. About half of the surface is streaked by a to-and-fro motion. Completely cover the area. Do not zigzag. The

same swab may then be dropped into a tube (125 by 15 mm.) of enrichment broth. The inoculation of the SS plate is completed by using a second sterile swab, cross-streaking over the inoculated area, and simultaneously streaking an uninoculated quarter of the plate. The final quarter is inoculated, using the same swab, but without cross-streaking. The amount of inoculum can be regulated to a degree. If the original swab is very heavily coated with feces, streak only one-quarter or even one-eighth of the plate with it; likewise reduce the cross-streaking, leaving a major part of the plate as the final lightly streaked quadrant. In some geographic regions it is found satisfactory to streak the whole plate with the original swab. It is ordinarily safe to do this when the swab has little or no gross fecal material. In the Korean epidemic the plates had to be inoculated lightly to avoid undesirably heavy growth; light inoculation is always necessary if the specimen is from an infant.

Only by inspecting the plate can it be ascertained if, in general, the inoculum needs to be lighter or could be heavier. Remember that areas of the plate too heavily or too lightly inoculated are almost valueless. In some geographic areas, even when the plate is inoculated heavily, virtually no growth on SS occurs on negative specimens. Attention to the technic of plating is required if a high percentage of all plates are to be considered as satisfactory.

If there is clinical or epidemiologic reason for suspecting *S. typhosa* infection in the persons being cultured, an initial plate of bismuth sulfite agar may be inoculated. This may be done as a streak or a pour plate. For the former, the surface of the prepared plate of medium is heavily streaked with the original swab. The pour plate is inoculated by first preparing a very cloudy fecal suspension in about 0.5 ml. of saline solution. Pour this in a sterile Petri plate. Add about 15 ml. of melted WB cooled to about 45° C. and gently rotate the plate to mix the inoculum and the agar before the latter solidifies. This method of inoculation is time consuming and should be considered as a special test which is particularly effective for *S. typhosa*.

An SS plate (also WB or BG if indicated) is inoculated from the enrichment broth after overnight incubation. A drop of the broth is transferred to the surface of the agar plate by a loop (5- or 6-mm. inside diameter) and prepared from about 22-gage nichrome wire. Streak by quadrants to provide areas with heavy, medium, and light inoculation.

The SS is incubated for from 20 to 24 hours at 37° C.; the WB for 48 hours. Plates of the former with any suspected colonies may be held at room temperature for re-examination on the following day. It is desirable to hold suspected WB plates at incubator temperature, discarding them only after 72 hours.

PICKING

The most important and the most difficult step in isolating enteric pathogens is the picking of plates. This is a job for the most dependable worker. The Quebec colony counter provides a good quality of artificial light and the proper dark background. Its use is recommended. If unavailable, a good source of daylight or artificial light is essential. Save time and energy by arranging conveniently the plates to be picked, the uninoculated tubes, racks for inoculated tubes, and a place for plates to be discarded and for those to be saved. *Make it an unbroken rule that plates will be picked in serial order.* This is the best assurance against errors in numbering.

There is no substitute for experience in learning the picking of plates. The beginner must be encouraged to pick freely—at least 2 of each type of suspected colony. The colonies of coliform organisms which grow on SS are red. The large, heavily opaque, colorless colonies almost invariably are nonpathogens. So, too, are the small, watery, clear ones. The sticky colony which draws out in a thread and has a rubbery consistency is neither shigella nor salmonella. Experienced technicians learn to recognize and pass these by. In contrast, the very suspicious-looking colonies are the round, translucent, colorless colonies, commonly about 2 mm. in diameter and of a soft to fluid consistency. The experienced worker must finally rely on the differential tube medium to separate the negative from the possibly positive colonies. Even more so, the less experienced technician must avoid making decisions on colony appearance alone. It is sound practice, when time permits, to identify the colonies picked by adding a letter to the specimen number and to keep notes on the colony appearance. On the following morning, the reaction on the differential medium may be compared with the type of colony described. Skill in the picking of plates is acquired only by such critical personal observations.

The characteristic *S. typhosa* colonies on WB are jet black, and have a sheen and a surrounding smoky halo. If crowded, the colonies may appear light green with dark green or black centers. The *S. paratyphi A* colonies are green or grey-green, sometimes with concentric rings of varying densities of color. Other salmonella colonies usually are larger than those of *S. typhosa* and are of a dark, lustruous, brown color.

On the less selective media, such as MacConkey's or desoxycholate agar, colorless colonies must be considered as possibly being enteric pathogens; therefore they must be picked.

On the surface of *all* selective media there are many viable organisms which have not grown. There will be contaminating

organisms under the suspicious colony which is being picked. To assure pure cultures, touch the center elevated surface only; particularly avoid a scooping motion in picking.

READING OF KLIGLER'S DIFFERENTIAL MEDIUM

The suspected colonies are stabbed and streaked to KIA slants with 1 percent sucrose added. It is both economical and satisfactory to tube this medium in 13- by 100-mm. test tubes. After from 18 to 24 hours' incubation, the inoculated tubes are examined, read, and separated according to reaction.

The cultures with acid and gas (indicator change from red to yellow) as produced by *Escherichia coli* and *Aerobacter aerogenes* are considered negative and discarded. Likewise, organisms which show no change or an alkaline reaction (a dark to purplish red) given by pseudomonas and alcaligenes strains are discarded. Organisms producing an acid reaction without gas in KIA are usually enterococci and as such are negative. It is advisable, however, to make a Gram stain before discarding these tubes. If the organism is a gram-negative rod, the possibility of *S. typhosa,* which occasionally gives this reaction, should be considered and the culture checked accordingly.

Those cultures showing an alkaline (red) slant and acid (yellow) butt without gas must be considered as possible shigella or *S. typhosa*. Most, but not all, of the latter produce sufficient hydrogen sulfide to give a superficial darkening first appearing around the point of beginning of the stab. The cultures which result in an alkaline slant and acid butt with gas may be salmonella. Most, but not all, salmonella, other than *S. typhosa* and *S. paratyphi A*, produce sufficient hydrogen sulfide to give a heavy blackening of the whole butt of KIA. In both instances, these cultures must be differentiated from anaerogenic and aerogenic proteus and paracolon organisms that produce identical reactions on this medium.

Thus, by the reactions on KIA, the possibly positive cultures are divided into those suspected of being shigella, *S. typhosa*, or other nongas-forming salmonella and those suspected of being the usual gas-forming salmonella. Although the same general steps in procedure are followed, certain variations in screening tests make it simpler to handle each group separately from this point.

SCREENING TESTS

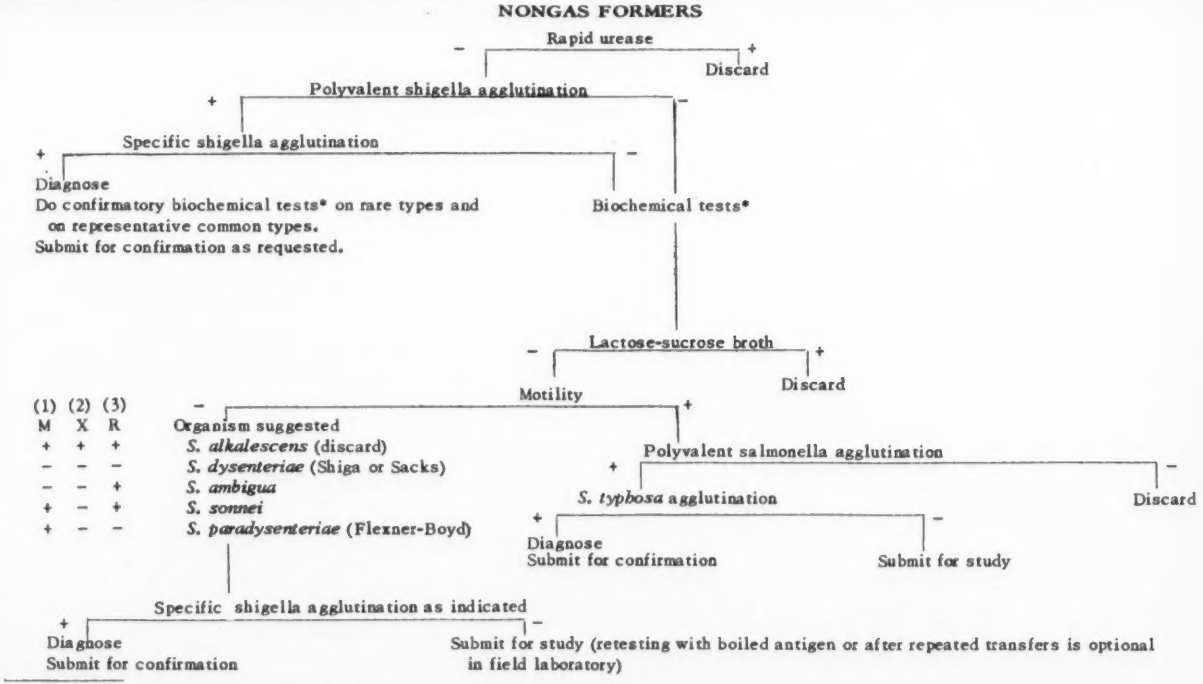
The isolation of enteric pathogens as described above must be done in laboratories close to the patient if findings are to be reliable for shigellosis. The identification of isolated organisms may be done in laboratories far removed from the patient.

What can be done in the field laboratory will depend on space, equipment, reagents, and personnel available. Thus the proper planning of screening tests involves a working agreement between the small field and the large central or general laboratories. The details of planned procedures may vary widely and no rigid outline of recommended screening tests is warranted. The major responsibilities of the small laboratory in addition to the initial isolation are (1) to use appropriate screening tests which will eliminate most of the "negative" organisms, (2) to use simple diagnostic tests which will provide the clinician with laboratory data of immediate value, and (3) to send to the central laboratory all suspected or doubtful cultures properly labeled. The central laboratory must be responsible for the definitive identifications. Its reports, if they are to have any clinical interest or value, must be returned without undue delay.

The laboratory work involved in the study and control of diarrheal disease in the POW camp on Koje Do, Korea, in the summer and fall of 1951, was done under military field conditions. Equipment and supplies had to be limited to the minimum essentials and even such items as incubators (or the electricity to operate them), glassware, media, and diagnostic antisera were not always available as needed. Moreover, in this outbreak from 300 to 500 enteric cultures were taken daily and from these many positive or suspected organisms were isolated. Necessity demanded that the less productive procedures be omitted. The screening and diagnostic technics used under these conditions are described as illustrative.

The procedures used in the field laboratory in Korea are shown in figures 1 and 2. Judging the probable purity of a culture is a recurring problem. We placed reliance on a careful picking of multiple colonies from the same plate. Only when there was gross evidence of contamination on the KIA slant was the culture replated for purity in the field laboratory. Thus if the reaction was one indicating a "negative" organism, the culture was discarded if on inspection of the slant there was no suggestion of contamination. The replating of all or large numbers of cultures for purity is not practicable for a field laboratory doing the maximum amount of work with minimal equipment, supplies, and personnel.

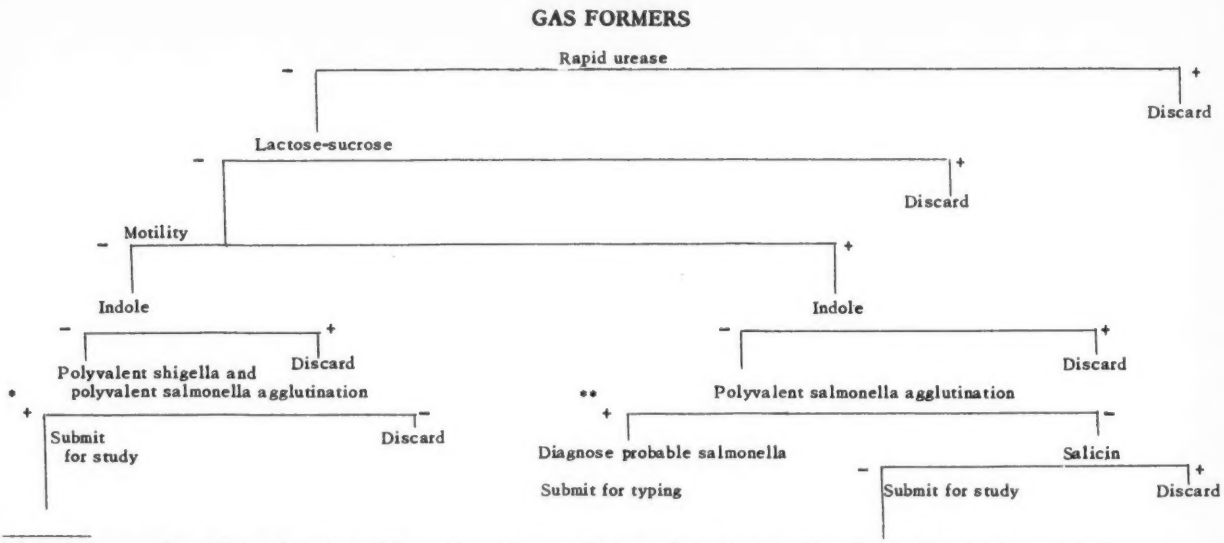
Proteus organisms were common in Korea and the detection of these by the rapid urease test was the first step in the examination of both the nongas formers and the gas formers. The urease reagent would ordinarily be provided from the central laboratory or purchased in a concentrated solution. The test is simple, involving only mixing a heavy inoculum of growth in about 0.2 ml. of reagent and incubating in a water bath at



(1) Mannitol (2) Xylose (3) Rhamnose

*These include simultaneously inoculated lactose-sucrose broth, motility medium, mannitol broth, xylose broth, and rhamnose broth

Figure 1. Procedures used in a field laboratory in Korea for the study of nongas-forming enteric organisms.



*Gas-forming strains of *S. paradysenteriae* (Newcastle) and apparently nonmotile strains of salmonella are encountered occasionally.
**In Korea *S. paratyphi A* was common and all probable salmonellas which produced no hydrogen sulfide were checked with specific *S. paratyphi A* antiserum.

Figure 2. Procedures used in a field laboratory in Korea for the study of gas-forming enteric organisms.

37.5° C. It is recommended that this test be read after 2 hours but, because there was very little change in the second hour, it was read by us after 1 hour in order to save time. All cultures giving a positive (red) reaction were assumed to be proteus and, if on inspection of the KIA slant the culture appeared to be pure, these were discarded. This simple procedure frequently eliminated half of the gas formers though ordinarily only a small proportion of the nongas formers. Any urease positive cultures which appeared to be contaminated were held, plated for purity on MacConkey's agar, picked and transferred to KIA. The subcultures are re-examined beginning with the rapid urease test.

The second step in the examination of the nongas formers was agglutination in a polyvalent shigella antiserum. Those available to us varied but that needed is one which contains antibodies for a high proportion of the pathogenic shigella occurring in the area in which the laboratory is located. The slide agglutination technic was employed for this presumptive serologic test. A 1-inch by 3-inch glass slide was marked into 2 rows of 5 squares each. A small drop of the polyvalent antiserum, diluted as directed for that particular lot, was placed on each square by droppers in the stoppers of the bottle. Growth from a KIA slant was transferred by sterile inoculating needle and emulsified in the antiserum. At least 5 tubes in succession were so handled and the slide was then rocked gently. A clearly positive reaction within the time limit stated for the serum is a satisfactory basis for providing an early presumptive and fairly reliable report to the physician. Ordinarily no further serologic tests would be performed in the field laboratory but in Korea typing with specific antiserums followed. Confirmatory biochemical tests were done also on at least one isolation from each new case and on all rare types, but ordinarily this too was left to the central laboratory.

The organisms giving the reaction of shigella on KIA but which were not positive in the polyvalent antiserum used were examined in 5 biochemical tests as indicated in figure 1 and table 1. The inoculation was done rapidly using a needle, first stabbing the motility medium and without returning to the KIA, dipping the needle in succession into the 4 broth tubes. The nonmotile, nongas-forming organisms which did not ferment lactose or sucrose were divided by their 24-hour reactions in mannitol, xylose, and rhamnose into probable types of shigella as indicated. All of these organisms require definitive study in the central laboratory but those giving the biochemical reactions of *Shigella paradysenteriae* (Flexner-Boyd), *Shigella sonnei*, or *Shigella ambigua* were usually found positive and reported as "organisms having the cultural characteristics" of the respective type. Those failing to ferment any or fermenting all

of the 3 sugars were often found to be other than pathogenic shigella. It is wise to delay any report on these. In our study in Korea these were carried to final identification in the field laboratory. The semisolid motility medium aided in picking out the possible *S. typhosa* and, if the necessary antiserum is available as it was in Korea, there can be an early presumptive identification of this organism.

TABLE 1. *Biochemical screening tests (Readings are made after from 18 to 24 hours of incubation)*

Motility (1)	Indole (2)	Lactose-sucrose (3)	Mannitol (4)	Xylose (4)	Rhamnose (4)	Organism suggested
−	V	−	+	−	−	*S. paradysenteriae* (Flexner or Boyd)
−	−	−	+	−	+	*S. sonnei*
−	+	−	−	−	+	*S. ambigua* (Schmitz)
−	V	−	−	−	−	*S. dysenteriae* (Shiga or Sacks strain)
−	+	−	+	+	+	*S. alkalescens*
+	−	−	+	+(−)	−	*S. typhosa*
V	V	+	V	V	V	No pathogen

(1) Using semisolid motility test medium.
(2) Performed on Sanders' lactose-sucrose medium using Kovac's indole reagent.
(3) The following formula was supplied by A. C. Sanders, Army Medical Service Graduate School.

Tryptose	20 grams
Dibasic sodium phosphate	1 gram
Sodium chloride	5 grams
Bromcresol purple (1.6 percent)	0.5 ml.
Distilled water	1,000 ml.
Autoclave at 15 lb. for 15 min. Allow to cool and aseptically add:	
Lactose	10 ml. (difco concentrate, 10 percent)
Sucrose	10 ml. (difco concentrate, 10 percent)

We simplified the method of preparation by adding sugars prior to autoclaving, then tubing and sterilizing at 15 lb. for 15 min.

(4) Prepared from bromcresol purple base or comparable preparation with the addition of 1 percent of the respective carbohydrates.
V = variable.

The gasformers which were urease negative were tested in the lactose-sucrose broth and the semisolid motility medium. Organisms which ferment the lactose and/or sucrose may be assumed to have no pathogenic significance and if apparently in pure culture may be discarded.

All nonmotile organisms which were indole-negative, were tested with polyvalent shigella antiserum (as a possible "Newcastle" strain) but if negative these were discarded. The remaining motile indole-negative, gas-forming organisms were the possible salmonella and these were checked by slide agglutination with the polyvalent salmonella antiserum. A presumptive positive report was submitted if they reacted. If negative, they were checked with salicin and discarded if this was fermented. Otherwise all organisms of this type must be carried to final identification in a central laboratory.

The value of the combined lactose-sucrose broth warrants emphasis. This was prepared according to the formula shown in table 1. It not only gives a rapid indication of lactose and/or sucrose fermentation but the same broth is used for the performance of a test for indole. Sanders recommends picking directly from plates to this broth and transferring from that to KIA and other test media. We have no experience with that procedure but did find the broth highly useful as we used it.

ORGANIZATION OF LABORATORY WORK

Laboratories in the Armed Forces to meet their needs must be organized for volume work. The time of a laboratory could be consumed readily by the detailed examination of a few enteric cultures, but a wise selection of technics may increase by many times the number of cases studied and the number of patients diagnosed by positive bacteriologic findings. In this way the field laboratory can greatly increase its value to the preventive and clinical medical services.

The major need in organizing bacteriologic laboratory service is a clear understanding and definition of the differing services of the small hospital or field laboratory and the large central or general laboratory. Close co-operation between them is essential. A critical attitude of superiority on the part of the central laboratory must be avoided. It must be appreciated that the quality of the laboratory diagnosis, particularly of shigellosis, is determined by the small laboratories close to the patient, not by the large but distant laboratory. It is the responsibility of the general laboratory to aid the local laboratory in every practicable manner, including a prompt identification of cultures sent for examination.

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ELECTIVE INDUCTION OF LABOR

Using Oxytocin Injection Intravenously

PAUL M. GOLD, *Captain, MC, USAR*

JOHN H. ANGELL, *Captain, MC, USA*

INDUCTION of labor for such conditions as toxemia of pregnancy and premature separation of the placenta has been part of our armamentarium for many years. To this we would add the induction of labor under proper supervision for the patient's convenience if certain prerequisites are fulfilled. The drug of choice for this procedure is oxytocin injection (pitocin). Its use was first suggested by Page *(2)*. Subsequently others have commented on its use in intrapartum inertia *(3–5)*. There have also been several reports on its use in the induction of labor *(6–9)*. These authors have generally commented on its relative safety under carefully controlled conditions. Most of these inductions were indicated by such maternal or fetal causes as premature rupture of membranes or dead fetus at term.

The obstetrical service of this hospital draws patients from a wide area. Some of them must travel more than 40 miles through heavy traffic. The risk of delivery en route for this group of patients, particularly for multiparas with a history of short labor, is great. These patients understandably worry about whether they can "beat the stork." If elective induction is used they may look forward to a leisurely drive to the hospital and a short easy labor.

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(1) Valley Forge Army Hospital, Phoenixville, Pa.

(2) Page, E. W.: Response of human pregnant uterus to pitocin tannate in oil. Proc. Soc. Exper. Biol. & Med. 52: 195-197, Mar. 1943.

(3) Theobald, G. W., and others: Use of post-pituitary extract in physiological amounts in obstetrics; preliminary report. Brit. M. J. 2: 123-127, July 17, 1948.

(4) Gordon, C. A.: Intravenous use of dilute posterior pituitary extract during labor. Am. J. Surg. 82: 76-80, July 1951.

(5) Labate, J. S., and Barbaro, A. J.: Use of dilute infusion of pituitrin in obstetrics. Am. J. Obst. & Gynec. 62: 1292-1299, Dec. 1951.

(6) Lubin, S.; Reynolds, S. R. M.; Waltman, R.; Tisdall, L. H.; and Delson, B.: Intravenous use of pituitrin for labor. Am. J. Surg. 81: 509-514, May 1951.

(7) Mauzy, C. H., and Donnelly, J. F.: Induction of premature labor by means of pitocin in patients with toxemia of pregnancy. Am. J. Obst. & Gynec. 64: 517, 1952.

(8) Reynolds, S. R. M., and others: Status of membranes and uterine contraction characteristics as criteria for clinical success or failure in use of pitocin by continuous intravenous drip for induction of labor. Am. J. Obst. & Gynec. 59: 1062-1068, May 1950.

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These patients are admitted to the hospital several days before the expected date of confinement. The exact date of admission is determined by clinical evaluation from rectal, vaginal, and abdominal examinations performed in the clinic during the last weeks of pregnancy. On admission, a sterile vaginal examination is made to determine the status of the cervix. It is essential for the cervix to be "ripe" before any form of induction can be considered. The following criteria are of the utmost importance if dependable rather than haphazard results are to be obtained with this procedure. In the primigravida, the fetal head must be engaged and the maternal pelvis ample. The cervix should point in the axis of the vagina, be at least 75 percent effaced and admit 1 finger. In the multipara the ripe cervix will admit 2 fingers and may be only 50 percent effaced. If the cervix is ripe, it has a distinctive elasticity, but if it is unripe, it is firm and rigid. If the membranes can be easily ruptured this is done. All patients with any cephalopelvic disproportion or with other than a vertex presentation are excluded. Grand multipara and patients with medical or surgical diseases are not included.

If the situation is favorable for the induction of labor, the patient is given an enema and sedated with demerol and scopalamine hydrobromide. An intravenous infusion of 1,000 cc. of 5 percent dextrose in distilled water containing 1 cc. of oxyticin injection is then started at a rate of from 10 to 15 drops per minute. Constant observation by the obstetrician is essential. The nature of the contractions and the fetal heart tones are observed repeatedly. The rate of flow is adapted to the uterine response and may be speeded to 30 or more drops per minute. The first reaction to the drug is a general increase in the tone of the uterine muscle. This is most pronounced in patients in whom the membranes have been ruptured. Should tetanic contractions or irregularities of the fetal heart occur, the infusion is either slowed or discontinued.

If one infusion fails to induce labor it can be repeated on a subsequent day, often with success. Lubin et al. *(6)* reported repeated infusions as a form of induction weeks from term.

After labor is established, the infusion is discontinued in some of our patients, but in others it is continued. In several patients in whom the drip is discontinued we have found that labor is desultory. It is our impression that the continuation of the infusion markedly decreases the need for operative interference other than the application of simple outlet forceps. It is also helpful to promote contraction of the uterus following the delivery of the placenta and thus decrease blood loss.

Our results in a series of 100 patients have been most satisfactory. Twenty-eight of these patients were primigravidas (including 4 who had spontaneous rupture of the membranes prior to the onset of labor). The average duration of labor for the group was 6 hours and 50 minutes (range, 3 hours to 18 hours and 30 minutes). Thirty-five were multiparas in whom the membranes were artificially or spontaneously ruptured prior to the beginning of infusion. The average duration of their labor was 2 hours and 50 minutes (range, 1 to 7 hours). Thirty-seven were multiparas with unruptured membranes. The average duration of labor in this group was 3 hours and 30 minutes (range, 1 hour and 30 minutes to 6 hours and 30 minutes). This may be compared with Peckham's *(10)* large series in which the average duration of labor for white primigravidas was 16.57 hours and for white multiparas was 10.91 hours. There were no serious complications or fetal deaths in our series. Spontaneous deliveries were the rule. It must be remembered, however, that this was a highly selected group of healthy patients with impending labor and vertex presentation.

CONCLUSION

We believe that the elective induction of labor using an intravenous drip of dilute oxyticin injection is of definite value in an obstetrical clinic that serves patients from a wide area. The patients must be carefully selected and the procedure properly supervised.

(10) Peckham, C. H.: Age distribution of 15,370 obstetric patients and its effect upon type of delivery. Am. J. Obst. & Gynec. 23: 635-642, May 1932.

BOOK REVIEWS

Adrenal Cortex, Transactions of the Third Conference, November 15-16, 1951, New York, N. Y., edited by *Elaine P. Ralli,* Department of Medicine, College of Medicine, New York University, New York, N. Y. 204 pages; illustrated. Sponsored by *Josiah Macy Jr. Foundation,* New York, N. Y. Price $3.25. Printed in the U. S. of America by Progress Associates, Inc., Caldwell, N. J.

This report is divided into 5 chapters. Each is concluded with appropriate references but without summary. There is no index. The main subjects dealt with are (1) effects of adrenal cortical hormones on renal function, (2) the hypothalamus and regulation of ACTH secretion, (3) determination of adrenal cortical steroids in blood, (4) the biogenesis of adrenal cortical steroids, and (5)

clinical use of adrenal cortical hormones and ACTH. The clinician will be especially interested in the last chapter and the investigator and endocrinologist will enjoy the whole book.

The last chapter includes (1) a practical discussion of the use of cortisone and ACTH in rheumatoid arthritis and adrenal and pituitary insufficiency; (2) evidence that of the collagen diseases, hormonal therapy definitely benefits only periarteritis nodosa; and (3) an interesting discussion of compound B and active compound F.—*Col. F. W. Pruitt, MC, USA*

Psychiatric Aide Education, by *Bernard H. Hall,* M. D.; *Mary Gangemi,* R. N., Litt. M.; *V. L. Norris,* A. B.; *Vivienne Hutchens Vail,* A. B., P. A.; and *Gordon Sawatsky,* A. B., P. A. The report of an experiment conducted by The Menninger Foundation in co-operation with The Topeka State Hospital under a grant from The Rockefeller Foundation, Topeka, Kan. The Menninger Clinic Monograph Series, No. 9. 168 pages. Grune & Stratton, Inc., New York, N. Y., publishers, 1952. Price $5.75.

This report describes (1) the thought and planning which preceded the establishment of the training program, (2) experiences during the 3 years of the experiment, and (3) the evolution of the curriculum growing out of these experiences. It will be of interest and value to anyone setting up or administering a program of psychiatric aid education.

—*Commander M. E. Roudebush, MC, USN*

Acute Peripheral Arterial Occlusion, by *William D. Holden,* M. D., Oliver H. Payne Professor of Surgery, Western Reserve University, School of Medicine; Director of Surgery, University Hospitals of Cleveland, Cleveland, Ohio. American Lecture Series, Publication No. 141, A Monograph in American Lectures in Circulation. Edited by *Irvine H. Page,* M. D., Cleveland Clinic, Cleveland, Ohio, and *A. C. Corcoran,* M. D., Cleveland Clinic, Cleveland, Ohio. 66 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1952. Price $2.35.

The purpose of this monogram appears to be to further stimulate the general surgeon's interest in the treatment of acute peripheral arterial occlusion. The value of early diagnosis and treatment is stressed. The cause, hemodynamics, clinical manifestations, and the treatment of all types of occlusion are adequately but briefly outlined. The book is recommended to all physicians and surgeons desiring a rapid review of the subject.

—*Capt. L. G. Bell, MC, USN*

RATES OF WOUND HEALING

When Standard and Experimental Burn Dressings Were Used

DANIEL S. J. CHOY, *Captain, USAF (MC)* (1)

IN a previous report (2), a new type of local therapy for burns was presented. It consisted of a rapidly applied, sprayable, inert vinyl plastic (XC7-9C) and had inherent and obvious clinical advantages over the standard pressure bandage method, especially with reference to thermal injuries of disaster proportions. This article deals with a study of the comparative rates of wound healing when the plastic and the standard petrolatum gauze dressings were used.

Method. Fourteen adult male and female albino rats, Sprague-Dawley strain, weighing from 250 to 350 grams, were used. Each animal was anesthetized with pentobarbital sodium, given intraperitoneally, and shaved on both sides of the abdomen. Both areas were painted with merthiolate. A circle 1 cm. in diameter was traced on both sides with a template. The areas were then repainted with merthiolate. With surgically clean (but not aseptic) forceps and curved scissors, the circular areas of skin were excised, exposing subcutaneous fascia. The skin defects were traced on cellophane. The plastic XC7-9C was applied with an applicator stick to the right wound and allowed to dry, leaving a transparent film about 0.002 inch thick. Petrolatum was applied to the left wound. A sterile 2- by 2-inch gauze dressing was applied over both wounds and kept in place with adhesive tape wound circumferentially.

The wounds were inspected at 3- or 4-day intervals under ether anesthesia, and the defects recorded on cellophane by direct tracing (fig. 1). At this time, the dressings were changed. Only in 3 or 4 instances, when the plastic film was inadvertently removed due to adherence to the overlying gauze, was it necessary to reapply XC7-9C. In the remainder, the original application of XC7-9C was adequate until complete healing had occurred.

Results. Healing times ranged from 13 to 14 days after the operation. Of the wounds treated with petrolatum gauze, 5 healed in 13 days and 9 in 14 days. Of the wounds treated with XC7-9C,

(1) Aero Medical Laboratory, Wright-Patterson Air Force Base, Ohio.

(2) Choy, D. S. J., and Wendt, W. E.: New local treatment of burns. U. S. Armed Armed Forces M. J. 3: 1241-1255, Sept. 1952.

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6 healed in 13 days and 8 in 14 days. There was thus no significant difference in rates of wound healing in this series of 14 comparisons.

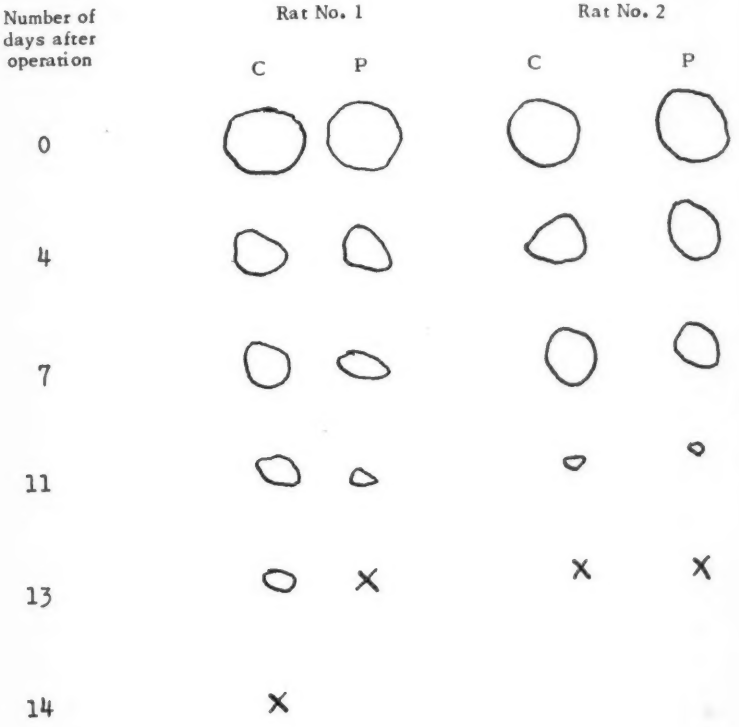

Figure 1. Representative rates of wound healing in 2 rats when the plastic and control dressings were used.

DISCUSSION

A study by Brush et al. *(3)* of a number of substances recommended for the treatment of burns revealed that among those which delayed wound healing were tannic acid in solution and in jellies, proflavine dihydrochloride, sulfhydryl, biodyne ointment, and 2 types of carbowax base. Wounds dressed with petrolatum

(3) Brush, B. E.; Lam, C. R.; and Ponka, J. L.: Wound healing studies on several substances recommended for treatment of burns. Surgery 21: 662-667, May 1947.

gauze healed in the same time as control wounds dressed with dry gauze.

In the evaluation of XC7-9C as a burn dressing, the question arose as to whether or not it delayed wound healing. The results of this experiment, with 14 sets of comparisons, indicate that wounds dressed with plastic XC7-9C and those dressed with petrolatum gauze heal at identical rates.

BOOK REVIEWS

Rypins' Medical Licensure Examinations, Topical Summaries and Questions, by *Walter L. Bierring,* M. D., F. A. C. P., M. R. C. P., Edin. (Hon.), Former Member, National Board of Medical Examiners, American Board of Medical Examiners; Professor Emeritus, Theory and Practice of Medicine; College of Medicine, State University of Iowa; Secretary, Federation of State Medical Boards of the United States; Chairman, American Board of Preventive Medicine and Public Health; Iowa State Commissioner of Health, with the collaboration of a Review Panel. 7th edition. 856 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., publishers, 1952.

This new edition provides a dependable aid for medical students as well as examinees of State Boards. The contents are divided in a section on the basic sciences and one on the clinical sciences. A concise and informative chapter on each major medical subject is followed by a carefully selected list of questions. The basic science section is especially well prepared. The amount of information so compactly presented is remarkable. The questions following each chapter cover the subject adequately. To provide better questions would be a challenge for any examiner. There have been extensive revisions and additions throughout the book, especially in the clinical science section. Detailed diagnostic and therapeutic procedures have been omitted, yet the material offered will be found, in most cases, adequate for the purpose intended.—*Lt. Col. R. Hederick, USAF (MC)*

Poliomyelitis, Papers and Discussions Presented at the Second International Poliomyelitis Conference, compiled and edited by *Morris Fishbein,* M. D., for the *International Poliomyelitis Congress.* 555 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., publishers, 1952.

In September 1951, virologists, epidemiologists, and clinicians with special competence in the study and treatment of poliomyelitis met in Copenhagen for the second Poliomyelitis Conference

of the International Poliomyelitis Congress to explore all phases of current knowledge of the disease. In 31 papers, the characteristics of the virus; its transmissibility in human beings and animals; its multiplication in cultures of human tissue; the pathology, pathophysiology, and treatment of the disease; and immunity and resistance to it were fully discussed. The work of the participants gives hope that poliomyelitis may be brought under control within the foreseeable future and that we may become armed with effective immunizing procedures and improved means and methods for treatment.

Discussions of the papers are included. A section of the book entitled "Reports of the Official Delegates" summarizes the status of poliomyelitis in 19 countries and about one-third of the book is devoted to the description and illustration of the scientific exhibits. The latter is an unusual feature and adds to the effectiveness of the presentation. The binding and paper are excellent and the illustrations are well chosen. An extensive bibliography is appended to most of the papers and to some of the discussions. The volume is highly recommended.

—*Col. T. F. Whayne, MC, USA*

Principles of Hospital Administration, by *John R. McGibony,* M. D., Medical Director; Chief, Division of Medical and Hospital Resources, Bureau of Medical Services, U. S. Public Health Service; American Board of Preventive Medicine and Public Health; Fellow American Medical Association; American Hospital Association; Fellow American Public Health Association; American Association for Advancement of Science. 540 pages; illustrated. G. P. Putnam's Sons, New York, N. Y., publishers, 1952.

Dr. McGibony, a recognized authority on hospital management, states that the purpose of his book "is to bring together much of the knowledge pertaining to hospitals and to make it available in compact form to all those interested in promotion of better patient care." The early chapters present the complex factors that are used in hospital planning. The organization and operation of hospitals are then discussed, and in the concluding chapter the reader is given valuable information on research in hospital services and resources. Portions of the book of particular interest to military hospital administrators are those dealing with better patient care, functional plans for hospital construction, functional hospital organization, and management and clinical services. The entire book is a helpful instrument for the military man who, aware of the increasing communication and exchange of personnel between federal and civilian hospitals, desires to increase his understanding of modern civilian hospital practices. There is an excellent index, and abundant references are given at the end of many of the chapters.—*Col. C. O. Bruce, MC, USA*

THE USE AND MISUSE OF DERMATOLOGIC PREPARATIONS

WILLIAM R. WALSH, *Lieutenant Commander, MC, USN (1)*

DERMATOLOGIC therapy has been the butt of 2 general criticisms. One group holds that dermatologists arbitrarily prescribe such a great variety of complex and mysterious compounds that it is a hopeless task for the nonspecialist even to approach the subject of dermatologic therapy; another group insists that dermatologists universally prescribe Lassar's paste for all skin diseases. Contradictory as these criticisms are, they accurately reflect the feeling of the average nondermatologist toward local therapy of the skin, i. e., that it is arbitrary, mysterious, and, on the whole, incomprehensible. With this attitude, it is hardly remarkable that the average medical officer, when he must treat skin diseases, turns to the proprietary compounds or to the mixture that is most readily available on his pharmacy shelf. Indeed this is the only thing for him to do unless he understands a few basic principles of the reaction of the skin to injury and of the physiologic actions of drugs on the skin.

It is the purpose of this article to outline a rational approach to dermatologic therapy and to demonstrate that good dermatologic therapy can be practiced with a surprisingly few, simple preparations. In prescribing for skin diseases, the type of the skin eruption, the classes of dermatologic preparations, and the physiologic actions of drugs on the skin must be taken into account.

THE TYPES OF SKIN ERUPTIONS

Like every other vital organ, the skin reacts to injury in a variety of ways and in a succession of stages. Skin eruptions may be exudative, vesicular, pustular, crusted, scaling, or thickened (lichenified), in the order of their increasing dryness or chronicity. The same skin disease, in different stages, may present itself as any of the types of eruptions mentioned. For this reason the general practitioner should think more of treating types of eruptions and less of treating specific skin diseases.

THE CLASSES OF DERMATOLOGIC PREPARATIONS

Before discussing the physiologic actions of drugs on the skin and some of the simpler drugs which can be prescribed to ac-

(1) U. S. Naval Hospital, San Diego, Calif.

complish these actions, it is necessary to understand something about the various classes of dermatologic preparations in which these drugs may be dispensed. These are soaks, lotion, pastes, creams, ointment, and powders. It is as important that a drug be dispensed in the correct class of preparation as it is that the correct drug be used.

The *soak,* or wet dressing, is the basic dermatologic preparation. Unfortunately the nonspecialist often uses other classes of preparation, such as ointments or creams, when soaks are clearly indicated. Soaks are cleansing, soothing, mildly antiseptic and antipruritic. They maintain drainage of infected areas and are excellent agents for relieving superficial inflammation. The indications for soaks—or baths, if the eruption is generalized—are the acute inflammatory, exudative, or vesicular eruptions such as vesicular or pustular eruptions of the hands, secondarily infected dermatophytosis of the feet, and rhus dermatitis. Infected or pustular lesions should be treated with warm soaks and the contact type of dermatitis should be treated with cool soaks. The best soak probably is Burow's solution which can be made in a 1:20 dilution by dissolving 1 domeboro tablet in 1 pint of water.

Lotions are suspensions of powders in a water or water-alcohol base. They primarily are drying and therefore antieczematous. They can carry a great variety of active medications. In general, the indications for lotions are the acute exudative dermatoses, and they usually are prescribed in combination with soaks. Examples of the indications for lotions are blistering sunburn, contact dermatitis, or eczematised tinea cruris. Because they are suspensions, these preparations require frequent shaking to redisperse the solid agents which have settled in standing. Therefore, they are commonly called "shake lotions." A simple shake lotion is one consisting of 15 percent zinc oxide, 15 percent talc, and 10 percent glycerin in water.

A *paste* is a solid suspension of a powder in an ointment type of vehicle. Pastes are much more adherent to the skin than lotions and therefore more protective. The indications for pastes are the subacute or chronic dermatoses, those of a more chronic inflammatory character, and those in which free drainage does not have to be encouraged. Pastes are used in subacute contact dermatitis or in any eczemas which are no longer weeping or vesicular. As with lotions, a great variety of active medications may be incorporated in pastes. The simplest is Lassar's paste which consists of equal parts of zinc oxide and starch in petrolatum.

Creams are water-in-oil or oil-in-water vehicles of a solid consistency. They are much more penetrating than the vehicles previously mentioned and are used to provide intimate contact

between the active agent and the skin. They are useful in subacute or chronic dermatoses, especially crusted eruptions such as the lesions of impetigo. As a base for creams, ointment base, water soluble (item 1-316-420) is effective.

Ointments are solid preparations with a fatty base. Although there are definite indications for ointments, they are too often prescribed when some other class of preparation would be more useful. They are lubricating, softening, very penetrating, and are effective in removing scales. They are indicated in the chronic, dry, scaling, or thickened eruption. They can be used, for example, in the dry, scaling type of dermatophytosis, or in psoriasis. Whereas lanolin and petrolatum formerly were the bases for dermatologic ointments, these have been supplanted in the last few years by the higher fatty alcohols. Too many patients were sensitive to wool fat and too many could not tolerate the friction and the soap required to cleanse the skin of petrolatum. Hydrophilic ointment (item 1-229-675) is an effective and easily removed ointment base.

Powders are primarily lubricating and are used to combat friction. They generally are used in the intertriginous areas when there is no acute exudative process.

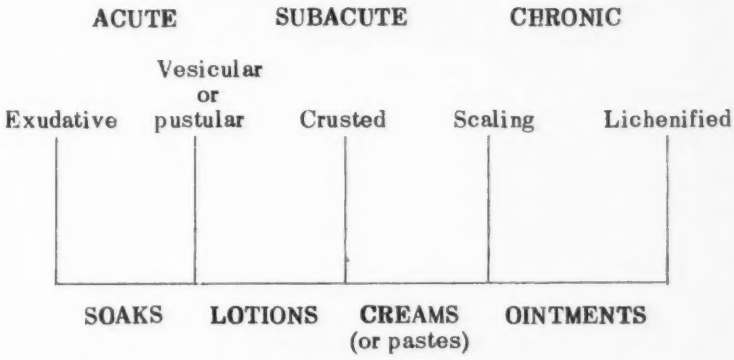

Figure 1. Classes of preparation indicated in different types of eruption.

Figure 1 shows the class of preparation to be used in each type of eruption and may serve as a guide for the neophyte. According to this scale there might be some question whether a cream or a paste is indicated in a given case, but there would be no excuse for applying an ointment on an exudative eruption.

THE PHYSIOLOGIC ACTIONS OF DRUGS ON THE SKIN

In every branch of medicine a drug is prescribed for its physiologic action on the body. This principle seems to be lost sight

of only in dermatologic therapy. Here we all too often find physicians prescribing local medication for the skin with no clear idea as to what specific action they want to accomplish or what the medication can accomplish. Medications applied to the skin may be protective, soothing, antipruritic, antibacterial, antifungal, antiparasitic, keratolytic, or corrosive. A simple therapeutic arsenal, built on the basis of intended action in the skin, can be outlined as follows:

Protection and soothing. When we prescribe a medication for these effects we signify that we do not expect the medication to do anything to the skin beyond relieving the symptoms of irritation and protecting it against further injury. In doing this, we permit the skin's reparative processes to operate and often no further, more active, medication is required. This is especially true in acute contact dermatitis, in which the aim of therapy is to discover and remove the offending substance and to protect the skin from further damage until it can regenerate. The class of preparation used to effect the protection and soothing will depend on the wetness or dryness of the eruption. In a very acute, oozing, inflamed dermatosis, protection and soothing can best be achieved by interrupted wet dressings of Burow's solution in a 1:20 dilution. A somewhat less exudative process can be treated with less frequent wet dressings, alternating with a lotion. For the subacute, drier eruption a paste, such as Lassar's paste, is indicated. We can continue across the scale to a chronic, dry, scaling eruption for which an ointment would be indicated.

Antipruritic. Pruritus is not nearly as common as is supposed, but when present a thorough investigation to determine the cause should be made. Many antipruritic drugs achieve their effect at too high a price. Some are extremely irritating; others are highly sensitizing. Among the latter are the cocaine derivatives. About 10 percent of patients using these substances develop a sensitization, whether or not it is manifested by an immediate contact dermatitis. Sensitization to a cocaine derivative is a real disability in this age because of possible cross sensitivity to related compounds of the para-aminobenzoic acid nucleus.

The possibility that the patient may not be able to obtain the benefits of procaine anesthesia from the dentist, may not be able to take sulfonamides, or may become sensitive to paraphenylenediamine, a basic dye substance, must be considered before a surface anesthetic is prescribed. The safest and most satisfactory antipruritic is menthol. It is prescribed in a 0.25 percent strength, the class of preparation depending on the type of eruption being treated. Thus for an acute, itching rhus dermatitis it could be prescribed in a lotion, but for a chronic, thickened pruritic patch of neurodermatitis a hydrophilic ointment base would be preferred.

Antibacterial. Pyogenic infections of the skin are common, either as primary pyodermas or, more often, as secondary infection of other dermatoses. There are innumerable antibacterial preparations for use on the skin, but many of them are extremely sensitizing or irritating. An effective antibacterial agent for general use is 3 percent vioform in ointment base, water soluble. Warm Burow's solution soaks or wet dressings should be used until the eruption has subsided to a degree that an antibacterial cream is indicated.

Antifungal. The injudicious use of fungicides probably causes far more disability than do fungus infections. An added irony is the fact that many dermatoses unskillfully treated with fungicides are not fungus infections at all. Actually fungi are responsible for a relatively small percent of all skin diseases and those which are truly fungus infections can be confirmed by simple laboratory tests. Fungi in the skin can cause eruptions that run the gamut from acute exudative eruptions to dry, scaling, hyperkeratotic plaques. The therapy depends on the type of eruption. The exudative types, which are common, should be treated only with soaks, preferably a 1:20,000 solution of potassium permanganate. After the acute exudative process has subsided a more specific fungicide may be used. The most practical one is fungicidal ointment (item 1-209-180).

Antiparasitic. The most common skin parasites are the scabies mite and the pubic louse. Fortunately, the gamma isomer of hexachlorocyclohexane is effective against both. Commercially it is known as gammexane or lindane. It is best employed as a 1 percent lotion *(2)*. Unlike sulfur and benzyl benzoate this is not irritating to the skin and, in the treatment of these infestations, only rarely is more than a single application required.

Keratolytic agents are indicated in dry scaling lesions in which it is desired to reduce the thickness of the skin. They, like the fungicides, can cause great damage if not properly used. They should never be used on exudative, vesicular, or inflamed lesions. The most common and the safest keratolytic is salicylic acid. It is usually dispensed in an ointment base because the eruption to be treated is the chronic, dry, thickened type. It may be prescribed in a strength of from 3 to 10 percent, depending on the thickness and the location of the lesions to be treated.

Corrosive agents are used to destroy tissue or abnormal growths. Although they must be used with caution, they can be used with a fair degree of safety on venereal warts. The agent most commonly used for these lesions is 25 percent podophyllum

(2) Pflug, S. C.: Emulsion of hexachlorocyclohexane for scabies. U. S. Armed Forces M. J. 2: 399-400, Mar. 1951.

resin in tincture of benzoin. This has a selective action on the warts only and though irritating to the normal skin, does not permanently damage it. Under this therapy, most venereal warts melt away after 2 or 3 applications.

That completes the dermatologic pharmacopeia, built on the basis of the desired effect on the skin. The only drugs or compounds mentioned were: (1) Burow's solution, (2) zinc oxide lotion, (3) Lassar's paste, (4) ointment base, water soluble, (5) hydrophilic ointment, (6) menthol, (7) vioform cream, (8) potassium permanganate, (9) fungicidal ointment, (10) salicylic acid, (11) gammexane, and (12) 25 percent podophyllum resin in tincture of benzoin. The average physician, not trained in dermatology, could probably practice much better dermatologic therapy with these few preparations than he could with twice or 10 times as many.

DERMATITIS DUE TO OVERTREATMENT

Overtreatment dermatitis is a dermatitis venenata due to medication applied externally. It may take the form of a reaction ranging anywhere from a mild vesicular eruption at the site of application to a generalized fatal exfoliative dermatitis. The initial eczematous response will be at the site of application of the offending substance, but from there it may spread to any or all areas of the skin if sensitization occurs. This bizarre behavior of the skin is difficult for the average physician to understand and, for that reason, he is loath to accept the explanation offered. He is more inclined to think that the original dermatosis, for which he applied the medicine, has spread to another location and his remedy for that is more of the same ointment. Each application of the offending medication results in a progressively more severe dermatitis.

Contact dermatitis due to medication is a primary cause of disability in skin diseases. Most consulting dermatologists say that the majority of the patients they see have been overtreated and that they must use bland nonspecific therapy for from 7 to 10 days either to allay a superimposed contact dermatitis or to discover what the basic condition really is.

The prevention of contact dermatitis due to locally applied medication involves: (1) the use of simple drugs of low sensitizing potentiality such as the 12 preparations listed above; (2) the avoidance of most proprietary compounds, which are usually a mixture of many, and sometimes mysterious, substances; and (3) a constant alertness for the appearance of contact dermatitis due to treatment and a willingness to change the medication as soon as this appears.

SUMMARY

The nonspecialist can practice safe and effective dermatologic therapy with a few simple preparations. He must first, however, understand (1) the types of skin eruption, (2) the classes of dermatologic preparations, and (3) the physiologic action of drugs on the skin.

BOOK REVIEWS

B-Vitamins for Blood Formation, by *Thomas H. Jukes,* Ph. D., Lederle Laboratories Division, American Cyanamid Company, Pearl River, N. Y. American Lecture Series, Publication Number 146, A Monograph in American Lectures in Pharmacology. Edited by *Chauncey D. Leake,* Ph. D., Vice-President in Charge of Medical Affairs, The University of Texas Medical Branch, Galveston, Tex. 113 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1952. Price $4.

This small volume contains a wealth of information concerning tested biochemical and physiologic relationships bearing on the cause and the treatment of blood dyscrasias, with emphasis on the megaloblastic anemias. Extensive coverage is accorded to the chemical and the clinical properties of pteroylglutamic acid and related compounds, antagonists of pteroylglutamic acid, the vitamin B_{12} group, and the intrinsic factor. The result achieved by the combined efforts of author and editor is a well-co-ordinated review of available experimental findings. The arrangement of most of the chapters is such as to permit ready access to material which is predominantly either biochemical or clinical. In view of the relative newness of the synthesis of pteroylglutamic acid (1945) and of the isolation of vitamin B_{12} (1948), it is appropriate that much or most of the literature cited in this monograph should be of recent origin.

—*Lt. Col. T. J. Domanski, USAF (MSC)*

Blood Clotting and Allied Problems, Transactions of the Fifth Conference, January 21 and 22, 1952, New York, N. Y., edited by *Joseph E. Flynn,* M. D., Associate Professor of Pathology, College of Physicians and Surgeons, Columbia University, New York, N. Y. Sponsored by the *Josiah Macy, Jr. Foundation,* New York, N. Y. 368 pages; illustrated. Printed by Corlies, Macy & Co., Inc., New York, N. Y. Price $4.95.

Although this volume deals with research problems, the chapters devoted to the clinical evaluation of the newer anticoagulants, and new clotting factors are of value to the clinician. The ex-

periences with the clinical use of tromexan and anticoagulant No. 63, are related and they are compared with dicumarol. Paritol C, treburon, and phenylindandione are evaluated clinically. Further studies regarding clotting are presented and controversial points are discussed. The latest concept of clotting differs greatly from the original theory of Howell, and the reader is introduced to such new substances as proconvertin, convertin, proaccelerin, accelerin, and antithrombin. As a result of the newer concepts several new hemorrhagic diseases have been described and a new classification has been proposed for the hypoprothrombinemias.

The second half of the book deals with the blood clotting changes following irradiation and the factors involved in the hemorrhagic manifestations which result from exposure to the products of nuclear fission. There is an excellent chapter on a proteolytic enzyme system in the blood, in which a fibrinolysin and an antifibrinolysin are factors.

The first chapters are the only ones which would be of interest to the internist. The chapters on irradiation will be of value to radiation therapists and those involved in the problems of atomic bomb casualties. The rest of the book will be of limited interest except to hematologists and laboratory workers in this field.

—*Commander H. A. Lyons, MC, USN*

Diseases of the Esophagus, by *Philip Thorek,* M. D., F. A. C. S., F. I. C. S., Associate Clinical Professor of Surgery (Formerly assigned to Gross and Topographic Anatomy), University of Illinois College of Medicine; Diplomate of the American Board of Surgery; Professor of Esophageal Diseases and Clinical Surgery, Cook County Graduate School of Medicine; Member of the American Association of Anatomists; Fellow, American College of Chest Physicians; Co-Surgeon in Chief of the American Hospital; Attending Surgeon of the Cook County Hospital; Senior Attending Surgeon of the Alexian Brothers' Hospital; Author of Text, "Anatomy in Surgery." Drawings by *Carl T. Linden,* Assistant Professor of Medical Illustration, University of Illinois College of Medicine, Chicago. 140 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., publishers, 1952. Price $10.

This is a comprehensive and much needed treatise on diseases of the esophagus from the surgeon's point of view. The anatomy and physiology are clearly presented and the pathology and surgical treatment of the various pathologic conditions of the esophagus are discussed with excellent accompanying drawings of lesions. Surgical procedures are well illustrated. The author includes in his chapter on esophageal hiatus hernia a discussion of all hernias of the diaphragm and the various treatments recommended. This book should be on the shelves of all medical libraries and should be read by all surgeons.—*Commander L. L. Haynes, MC, USN*

SELF-CURING ACRYLIC RESIN CROWNS AND INLAYS

SEYMOUR M. LONDON, *Lieutenant, DC, USNR (1)*

THE demand for restoration of broken-down upper anterior teeth at this naval receiving station is great. Ship movements resulting in limited availability of patients for whom treatment was recommended necessitated a rapid restorative method. The purpose of the technic here described is to provide an immediate replacement for extensive loss of tooth structure. It is used mainly for the upper 6 anterior teeth and can be accomplished in 1 sitting.

As with all dental materials used in operative dentistry the methyl methacrylates have their advantages and disadvantages. The search still continues for the ideal filling material. There is probably more room here for improvement in anterior restorations than in any other procedure in dentistry. The use of the acrylics as filling materials is not the ideal solution; it is merely a step in the right direction, and only through the use of this material will we be able to evaluate its place in dentistry.

I will not describe the strictly operative procedures, and the suggested technics are only some of those that are being developed. The operator is familiar with the characteristics of the material he uses. End results usually speak for themselves, and what might be preferred by one dentist, need not necessarily be preferred by another. Self-curing acrylic resin has, however, a definite place in dentistry.

SELF-CURING ACRYLIC RESIN CROWNS

The two main types of self-curing acrylic resin crowns are (1) conventional jacket crowns, which are usually placed on vital teeth; and (2) dowel or post crowns, which are placed on nonvital, badly broken teeth. The prerequisite for this second type of crown (usually preferred for all nonvital teeth) is a good root-canal filling.

Contraindications. When it is possible to process a crown conventionally, the self-curing acrylic resin technic should be second choice. When in the construction of the crown it is found

(1) Naval Receiving Station, U. S. Naval Base, Norfolk, Va., at time of writing.

that there are several shades to be incorporated in it, this technic is not advisable. Gingival and incisal shading is almost an impossibility with this technic because the material is mixed on a glass slab and applied in bulk to the tooth preparation.

Advantages. The greatest advantage of this technic is the rapidity of completion of the crown. The application of the material directly to the tooth, making it a direct type of crown, produces a well-fitting crown.

Disadvantages. The impossibility of color blending is the main disadvantage to this technic. There may also be certain tooth contours that cannot be established in this manner, although generally it is applicable for most restorations. The carving and contouring of the tooth is performed in the mouth and this might be considered to be a disadvantage.

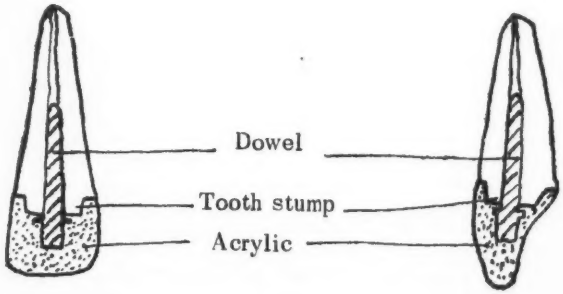

Figure 1.

Tooth preparation. Conventional jacket crown preparations which include a definite gingival shoulder are used. In dowel crowns, there is a modification in this type of preparation due primarily to the material involved. It is not necessary to have a smoothly contoured gingival surface as is usually required with the Davis or Richmond type of crown. Even though most of the tooth stump is reduced, a definite shoulder is still prepared (fig. 1).

With the dowel crown it is necessary to fit the dowel snugly into the root canal. This is best accomplished by using the Peeso root reamers, removing enough root-canal filling to accommodate the post. Ream to a definite distance so that, after cementing, the post and root-canal filling form a continuous seal in the canal. It will sometimes be found that the hole made by the reamer is not wide enough at the tip to receive the stock dowel that is used. By carefully using a No. 4 bur, the apical third of the reamed portion of the canal may be sufficiently enlarged to receive the dowel.

The reasons for allowing a portion of the tooth stump to remain are that (1) it enables the crown to have a little more retention than it would have if the entire stump were removed; (2) the stump serves as a key or lock (meaning that the tendency for the crown to rotate is eliminated); and (3) a definite seat for the crown is provided during cementation. As with conventional preparations, all margins should be carried well up under the free gingiva, preferably 1 mm., although under some circumstances a lesser amount is acceptable.

Figure 2.

Impression technic. The only difference between the conventional copper-band impression and the technic used here is the material used. The copper band is festooned in the usual manner so as to fit snugly over the margin of the preparation. If there is a choice to be made between a smaller and larger band, the larger should be used. After the band is well fitted, it is placed on the tooth and then squeezed labiolingually to obtain the proper mesiodistal diameter of the crown (fig. 2). Annealing is contraindicated.

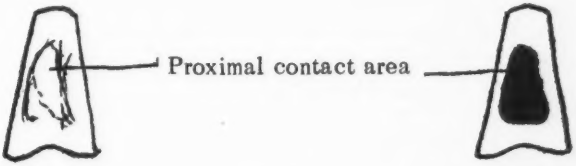

Figure 3.

With the band in place at this point, a sharp explorer is used to scratch the proximal area of contact between the band and the adjoining teeth. This is usually a triangular-shaped marking on the proximal surface of the band (fig. 3). This area is cut out with a suitable fissure bur. The band is then removed from the mouth and a piece of thin matrix material is wrapped around it and secured with a tinner's joint (fig. 4). The thinner the matrix material, the better, although it should not be thin enough to tear when placed under pressure. The metal matrix material supplied with the acrylic resin kits is satisfactory. This matrix material

eliminates the excessive thickness of the copper band and thereby makes for better contact between the crown and the proximating teeth. Furthermore, it provides a method of confining the acrylic in the band so that when pressure is applied, a dense material is obtained.

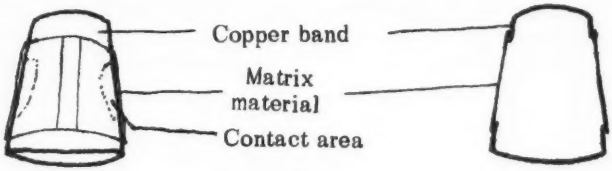

Figure 4.

Processing. The shade is selected in the usual manner, although it is advisable to select the darker of the two shades closest to the one desired. It is sometimes necessary to use more than one shade for the production of the desired final shade. The shade or shades selected are placed on a cool slab. If more than one shade is selected, they are mixed dry. Because this material is handled differently than others, the manufacturer's directions should be followed. A patting motion rather than spatulation should be used in mixing. This brings the excess monomer to the surface and more powder can be easily incorporated into the mix. The density of the crown is probably dependent more on the mix obtained on the slab than on any other part of this technic.

After the mix reaches the proper consistency or the dead pack stage, the bulk of material is placed in the copper band. The tooth should be clean and dry. The mix is then carried to the proper position and forced into place with finger pressure on the incisal opening of the band. For jacket crowns, the material is allowed to set until heat has begun to generate. It is removed from the mouth and allowed to complete its polymerization either on the dental tray or, preferably, on a hot sterilizer. Only about 20 seconds are necessary to complete the cure on the sterilizer. A longer time will cause the acrylic material to dry out and contract. For dowel crowns, the material is allowed to complete its cure in the mouth. The main difference from the jacket crown is the fact that the material is provided the opportunity of getting a firm grip on the stock dowel without any chance of distortion.

Carving and contouring. The copper band is peeled away from the acrylic material. The gingival margin then serves as a guide to the removal of any gingival flash with fine disks. The acrylic material is returned to the tooth, and carving with suitable stones, disks, and wheels completes the crown. It should be polished

with fine pumice followed by whiting, zinc oxide, or tin oxide. The contact points are tested with dental floss. If found to be insufficient, additional material may be painted on. The only objection to this is that the density of the material may vary because of the difference in technic in handling the acrylic. It is better to obtain sufficient contacts with the original amount of material.

Cementation. The cementation of the dowel crowns has been accomplished by using the ordinary oxyphosphate cements. If the labiogingival portion is thin, a shaded cement is indicated. A clean, dry tooth and crown are the only precautions necessary.

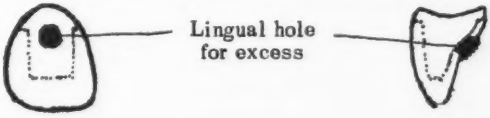

Figure 5.

The cementation of the jacket crowns is another matter. Numerous cementing substances have been tried, and most of them have been found to be only fairly satisfactory. At present, a new method of cementation which makes use of the same material that was used to construct the crown is being tried. It is a type of welding of the crown to the tooth because the cementing substance and the crown itself become one solid mass.

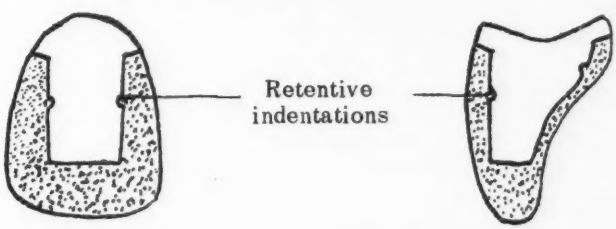

Figure 6.

A hole is cut in the lingual aspect of the crown with a No. 4 bur. This hole is located in the area of the linguogingival fissure (fig. 5). For retention of the crown on the tooth, a No. 2 bur is used to make indentations in the axial surfaces of the tooth preparation to a depth of about half the diameter of the bur (fig. 6). Both the tooth and the crown are washed with water and dried thoroughly. The cementing process is then begun.

On a clean, cool, glass slab, a small amount of the powder is placed at one edge. Just before the mixing is begun, a drop of monomer is placed in the crown. Then a thin mix of the acrylic is

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made and placed in the crown approximately in the areas which would correspond to the areas of indentations made on the tooth preparation. This mix will have a tendency to dry out rapidly and thus prevent the proper seating of the crown. To overcome this, another small drop of the monomer is placed in the crown and the crown is set in place. It is firmly seated, tapped lightly with a surgical mallet several times, and allowed to set until the excess which escapes through the lingual hole has hardened.

When the cementation is completed and the material is sufficiently hardened, the lingual knob of material may be easily reduced and final finishing accomplished with a stone, rubber Burlew disk, and pumice.

Final examination. After the crown has been completed, there are several observations that should be made to insure complete success. Gingival marginal adaptation should be checked gently with an explorer to insure the proper seating of the crown. At times there may be an escape of some gingival flash during the cementation. This should be checked and removed. The final point to be observed is that proper occlusion has been established for the crown, particularly in the protruded relationship of the mandible. Because of the tendency of this material to flow under stress, it is often advisable to relieve the occlusion slightly to prevent this from occurring.

SELF-CURING DIRECT ACRYLIC RESIN INLAYS

This type of restoration is used primarily to restore the incisal angles of the anterior teeth when the only other operative procedures that would be indicated are jacket crowns or gold castings of some sort. The constructed inlay is usually placed in such a manner as to receive a minimum of stress and strain. The tendency of this material to flow when placed under stress must always be considered an important factor in its use.

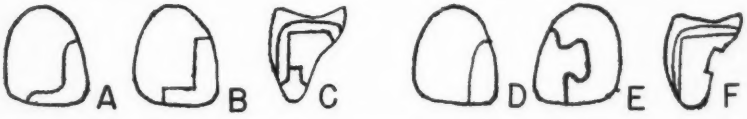

Figure 7. (A), (B), *and* (C) *Incisal step type.* (D), (E), *and* (F) *Lingual lock type.*

Cavity preparation. Two basic types of cavity preparation are used for these inlays. Both are the class IV preparations, one being of the incisal step variety (preferred) and the other being of the lingual lock variety. A conventional cavity preparation is used with parallel or slightly divergent walls cut to permit the drawing of the inlay. No bevels are placed and it is desirable to have sharp, well-defined cavosurface angles (fig. 7).

Casting the inlay. This procedure is so called because the inlay is cast directly to the tooth. A piece of steel matrix material is inserted interproximally so as to extend incisally beyond the length of the crown (fig. 8). It is securely wedged in place gingivally and then adapted around the tooth and held in place with the fingers or a suitable clamp. The wedging of the band provides enough separation to insure contact and it closely adapts the matrix to the gingival margin of the preparation.

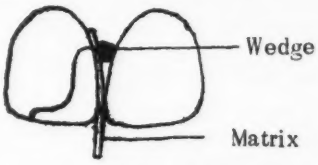

Figure 8.

After the band is adapted to the tooth, the acrylic is mixed to the proper consistency on a clean glass slab. One mass of the material is then carried to the tooth and forced into the cavity. An excess of the material should be allowed to extrude incisally so that pressure may be applied with the finger or a suitable plastic instrument. If a plastic instrument is used, the heel of its blade should rest on the sound portion of the incisal edge of the tooth, with an inclination of the blade incisally so as not to shorten the length of the restoration prematurely. Pressure is maintained constantly during the initial set of the material and the band is removed only after all the heat has been disseminated (usually after from 4 to 6 minutes).

The inlay is then carved to proper contour with only a slight excess remaining around all the margins except those which are inaccessible in the mouth. The gingival margin should be trimmed to proper form.

Cutting retention points. In the discussion of the cavity preparation, no mention was made of the retention of these inlays. In this technic no retention was incorporated into the cavity preparation so that the inlay could be removed from the tooth. While the inlay is out of the mouth, it is advisable to leave it in a cup of water to prevent its drying out. Retention areas should be cut in the tooth in such a way that the angles are rounded leaving no sharp retentive points. If possible, these areas should be continuous. This has been found to be best accomplished by using a No. 2 bur, which is carried around all the line angles that are in the preparation so as to incorporate a continuous retentive groove.

In the case of the incisal step type of preparation, this same No. 2 bur is used to sink a pinhole in the gingival floor and a pinhole in the distal extremity of the incisal step (fig. 9). The depth of this pinhole is usually the diameter of the bur. The walls of the pinholes are formed with a No. 557 fissure bur. What can be considered as the floors of these pinholes are further made retentive by using a No. ½ bur around the base-line angles (fig. 10).

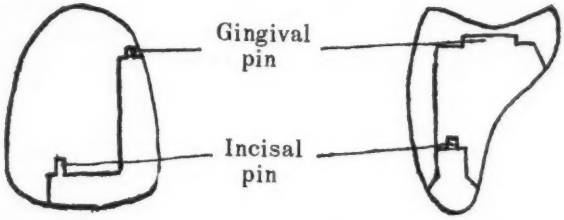

Figure 9.

It was previously mentioned that the incisal step type of restoration was preferred. The reasons for this are primarily based on the mechanical type of retention that is necessary to hold the inlay in the tooth. There is no adhesiveness of this material to the walls of the cavity and, as a result, retention must be considered as mechanical. The incisal step inlay provides more of an opportunity to lock itself into position. The critical points are located in the areas of the incisal pin, the axiopulpal line angle, and the gingival pin (fig. 11).

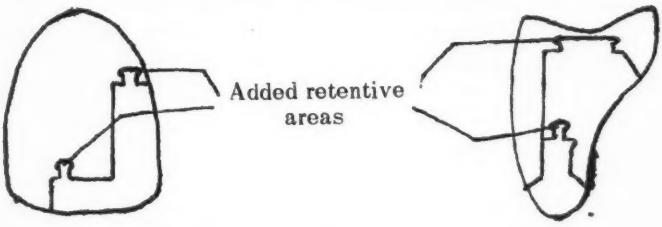

Figure 10.

These 3 areas permit the filling to be firmly locked in position. In the lingual lock type of inlay the greater amount of retention depends on that area of the lingual lock. The biggest drawback to the use of this type of inlay is the bulk of material that is butted up against tooth structure along the line of the axial margin of the restoration (fig. 12). As was previously mentioned, because of the lack of adhesiveness of the material and its tendency to flow under stress, this inlay should be used

only as a second choice, the incisal step type being preferred. The choice as to which type of inlay to use may come up and it has been found that the only factor involved is the labiolingual width of the tooth in question. For a thin labiolingual tooth, use the lingual lock. For a thick labiolingual tooth, use the incisal step.

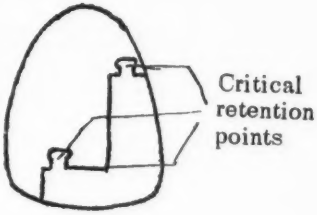

Figure 11.

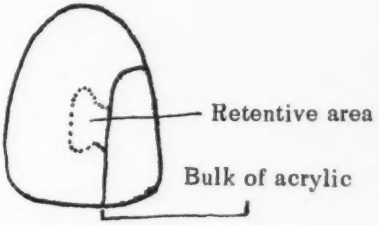

Figure 12.

Cementation. The cementation of these inlays is similar to that used for jacket crowns. There is a dual purpose here in using the acrylic material as the cementing substance. The first consideration is the fact that the material used in cementing and the material of the inlay become one solid mass. This might be thought of as approaching the ideal situation because it eliminates the use of an intermediary cementing substance. Furthermore by using this method of cementation, most of the contraction during the initial set of the inlay is compensated for, although not necessarily completely eliminated. Recent studies have shown that on setting, about 7 percent contraction occurs.

The cavity is washed with warm water and dried thoroughly after the retentive areas have been cut. The inlay, which during the period it is out of the mouth has been kept immersed in water, is also dried thoroughly. A thin mix of the acrylic material is placed in the cavity; a drop of the monomer is placed on the inlay; and the inlay is carried to position and properly seated by exerting great force. The pressure used in seating the inlay is maintained for at least 6 minutes. The pressure need not be excessive, but it should be sufficient and constant. Intermittent pressure causes rocking with resultant distortion.

Finishing of the inlay may be instituted after a period of from 15 to 20 minutes. A good determining factor as to when the finishing might be started is the hardness of the excess which extrudes beyond the margins of the inlay. When this material is brittle, finishing may be started. Careful polishing should be done with fine disks and the material trimmed down to the margins of the cavity preparation. Permitting a slight flash to remain makes for easier staining of the margins as well as the possibility of

inducing seepage to take place. The last step is the use of fine pumice. This too should be done carefully so as not to remove more of the inlay than is desired.

Incompatibilities and lack of setting. Mention has often been made of the use of a clean and cool glass slab. The reason such stress has been placed on this point is simply to eliminate work. The incomplete setting of this material is probably caused more by contaminated mixing instruments than anything else. Eugenol and some other essential oils are not compatible with the methyl methacrylates. Because eugenol is used often in the dental office, care should be taken to keep it away from the monomer and polymer of the acrylic kit. A separate glass slab and spatula should be kept for the specific use of mixing the acrylics.

SUMMARY

Self-curing acrylic resin crowns and inlays have been found to be satisfactory restorations in over 100 patients who were available for only a short time. When time permits, self-curing acrylic crowns and inlays should not be substituted for laboratory-processed restorations.

BOOKS RECEIVED

Clinical Applications of Suggestion and Hypnosis, by *William T. Heron,* M. A., Ph. D., Professor of Psychology, University of Minnesota, Minneapolis, Minn. 2d edition. 137 pages. Charles C Thomas, Publisher, Springfield, Ill., 1953.

Gifford's Textbook of Ophthalmology, by *Francis Heed Adler,* M. D., Professor of Ophthalmology, University of Pennsylvania Medical School; Consulting Surgeon, Wills Eye Hospital, Philadelphia, Pa. 5th edition. 488 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publishers, 1953.

Treatment of Mental Disorder, by *Leo Alexander,* M. D., Director, Neurobiological Unit, Division of Psychiatric Research, Boston State Hospital, and Instructor in Psychiatry, Tufts Medical School. 507 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publishers, 1953.

TREATMENT OF RHUS DERMATITIS

Ineffectiveness of Cortisone

ROBERT J. HOAGLAND, *Colonel, MC, USA*

THE treatment of rhus dermatitis is a fertile field for medical and nonmedical writers. Innumerable remedies have been proposed by both groups; and annually new remedies are proposed, hailed by uncritical users, and ultimately discarded or sporadically used in the vain hope that the course of the disease will be altered. The large number of curative remedies proposed without convincing evidence of merit reflects the prevalence of uncontrolled investigations.

Investigation and evaluation of a proposed treatment for poison ivy dermatitis is difficult because there are individual variations in the type of lesion resulting from exposure. In some patients the lesions are chiefly papular; others have blebs, vesicles, and oozing lesions; and others have a cellulitis. Most patients complain of pruritus, but some have little or no itching. The final extent of involvement and the severity of the disease cannot be predicted accurately when the patient is first seen because new lesions often continue to appear for several days after exposure. Trauma produced by scratching during sleep may delay recovery. For these reasons, comparisons of different modes of treatment in different patients are misleading. Comparisons of new treatments with treatments used on previous occasions by the same patient are also unreliable because the degree of dermatitis in previous attacks is not known to the investigator, the susceptibility of patients is variable, and patients' memories are faulty. Successive use of different medications on the same lesion cannot lead to convincing conclusions because the first medicament is usually applied while the disease is in its ascendancy, whereas later treatments may merely coincide with spontaneous recovery. Furthermore, unless patients are carefully observed, it cannot be ascertained whether the remedies prescribed are being properly used and whether subjective improvement is reflected in rapid healing. Finally, the most experienced observer cannot predict, with accuracy, how large the individual lesions and how extensive the area of dermatitis will become or how long the dermatitis will last. This inability to forecast the progress of the disease makes the careful control of investigations of curative agents doubly necessary.

In a previous paper on this subject *(1)* the literature was reviewed and it was further observed that locally applied tripelennamine cream, zinc sulfate solution, tannic acid solution with chlorothen, propylparahydroxybenzoate, and ethyl chloride spray were ineffectual.

In view of the favorable influence of cortisone on the course of allergic conditions and its dampening effect on some inflammatory responses to stress, it seemed worth while to use this hormone, orally and locally, in treating rhus dermatitis. A 3-percent aureomycin ointment was used also locally on several patients receiving cortisone to investigate the possibility of curtailing the course of ivy poisoning by affecting superficial bacteria.

METHOD

Patients were divided into 3 groups. In the *first* group alternate patients were given cortisone tablets *(2)* and similar-appearing placebo tablets orally. Both sets of patients received only petrolatum locally. The ward nurse dispensed the 2 kinds of tablets alternately in accordance with a program laid down prior to the start of this investigation. I was unaware of which medicine patients were receiving until after evaluation of the results. Cortisone was dispensed thus: 300 mg. was divided in 4 equal doses on the first day; 200 mg., on the second; and 100 mg., on the third and fourth days of treatment.

The *second* group received cortisone orally and aureomycin ointment *(3)* locally. In this group also, I was unaware of the treatment employed until after evaluation of the results. These patients were interspersed among the first group so that the placebo-treated patients could be used as controls for both cortisone-treated groups

In the *third* group, uniform-appearing areas of rhus dermatitis were divided into equal halves by an indelible line. The area on one side of the line was treated with dibucaine ointment *(4)* and the other was treated with 2.5-percent cortisone acetate ointment *(2)*. All patients were otherwise healthy young men. Additionally 4 patients (2 women and 2 boys) received cortisone and petrolatum, but I was aware of the form of their treatment. Dosages were the same except for one of the boys (age 6).

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(1) Hoagland, R. J.; Myers, P. W.; and Cosand, H. C.: Treatment of Rhus dermatitis. J. A. M. A. 146: 612-614, June 1951.

(2) Supplied by Merck and Co., Inc.

(3) Supplied by Lederle Laboratories.

(4) Supplied by Ciba Pharmaceutical Products, Inc.

Several patients with moderate or severe pruritus received tolserol (5) orally or eurax lotion (6) without triethanolamine locally to investigate the possible antipruritic effects of these drugs.

RESULTS

The results are shown in table 1. Of 12 cortisone-treated patients, recovery seemed to be hastened in 3, whereas 3 of 7 placebo-treated patients also appeared to have had an accelerated course. Of 4 cortisone-aureomycin ointment-treated patients 2 seemed to recover faster than was expected. The unreliability of judging the effect of a treatment for rhus dermatitis on clinical experience is shown by the fact that almost half of the petrolatum-treated patients seemed to be recovering somewhat faster than usual. Sentences from progress notes made while I was observing the course of illness, and unaware of the treatment being given, are of interest.

TABLE 1. *Results of treatment of rhus dermatitis with cortisone*

Medication	Number of patients	Degree of severity of dermatitis			Number of patients recovering faster than initially anticipated
		Mild	Moderate	Severe	
Placebo, orally	7	1	2	4	3
Cortisone, orally	12*	3	3	6	3
Cortisone orally and aureomycin locally	4	0	2	2	2

*Four patients were treated with cortisone separately from the "blindly" treated alternate cases. Of these, 2 had mild, 1 moderate, and 1 severe dermatitis.

Case 1. First lesions were noted on 19 August 1951. Treatment and hospitalization were started on 20 August. The dermatitis was moderately severe. On 22 August I wrote: "Definite acceleration of recovery." On 23 August: "We can call this healed now—very fast for this degree of involvement." This patient had received a placebo. He had the most dramatic "cure" of any patient.

(5) Supplied by E. R. Squibb and Sons.
(6) Supplied by Geigy Co., Inc.

Case 2. Treatment began on day dermatitis began (31 May) about 18 hours after exposure. Twenty-four hours after starting treatment I wrote: "Slight increase in size of vesicles." On 2 June: "No change." On 4 June: "Lesions have reached a plateau level, but new vesicles have appeared." On 7 June: "Recovered. This patient has had far worse experiences in previous years, but this episode of dermatitis did not disappear unusually fast." This patient was treated with cortisone.

Case 3. One woman with severe dermatitis first noticed lesions on 4 September 1951 and I knowingly prescribed cortisone on 6 September. The dermatitis steadily worsened for 4 days and she was not cured until 21 September. My notes stated: "Treatment unquestionably valueless."

Reliable appraisal of the value of local treatment can readily be made if investigators will divide a uniform area of dermatitis with an indelible line and treat one-half with a medicament and the other with a substance known not to affect recovery. In at least one report advocating the use of zirconium (7), no control areas were used.

The 2.5-percent cortisone acetate ointment applied to rhus dermatitis did not speed recovery. Areas treated with this agent evolved no differently than the dibucaine-treated areas. Six patients with moderate or severe itching had eurax lotion applied to selected areas. They were not in the "blindly" treated group. Eurax was used because it had been reported as having antipruritic effects. A lotion without triethanolamine was used. It did not lessen pruritus in any patient.

Five patients, not in the "blindly" treated group, with moderate or severe itching received tolserol to test the antipruritic effect of this drug. It did not allay itching, but one patient stated that she felt unusually relaxed and could sleep without being awaked by pruritus. This drug was given in 4 daily doses of 1 gram each.

CONCLUSIONS

Patients with rhus dermatitis who were given cortisone orally did *not* recover more promptly than those receiving placebos.

Areas of rhus dermatitis treated with cortisone acetate ointment did *not* heal faster than those treated with dibucaine ointment. Tolserol given orally and eurax lotion without triethanolamine applied locally were ineffectual in allaying the pruritus of rhus dermatitis. Aureomycin ointment applied locally may accelerate recovery and deserves further investigation.

(7) Cronk, G. A., and Naumann, D. E.: Zirconium treatment in ivy poisoning; preliminary investigation. J. Lab. & Clin. Med. 37: 909-913, June 1951.

EPIDEMIOLOGY OF LEPROSY IN AMERICAN SAMOA

JOHN A. C. GRAY, *Captain, MC, USN*

THE increasingly frequent occurrence of cases of leprosy in American Samoa in the past decade, and especially the recognition of several new patients within the span of a few weeks in 1949, suggested that the disease was becoming a major public health problem in the islands. For this reason a study of its epidemiology was undertaken. I wish to (1) call attention to a hitherto undescribed area of leprosy endemicity, (2) present the pertinent facts, and (3) describe the preliminary control measures taken.

GEOGRAPHIC, CLIMATIC, AND DEMOGRAPHIC DATA

Six of the 7 islands of American Samoa are inhabited. They constitute part of the Samoan Archipelago, the larger part of which is known as Western Samoa, and is administered under a trusteeship for the United Nations by New Zealand. The archipelago lies about 14 degrees of latitude south of the equator, and the American (Eastern) and Western portions are separated by the 171st parallel of longitude. This separation is purely political. The island of Tutuila, American Samoa, and of Upolu, Western Samoa, are within sight of each other on a clear day.

The islands are volcanic in origin. The total area of American Samoa is about 76 square miles, most of which is mountainous and uninhabitable. The climate is warm, moist, and tropical, with a mean temperature of about 80° F. throughout the year. Rainfall is high, having averaged 198.4 inches during the past 50 years *(1)*. Soil productivity in arable areas is great and food is abundant.

The population in 1950 was 18,602 *(2)*. The birth rate averages in excess of 40 per thousand and the death rate about 10 per thousand *(3)*. The people are members of the Polynesian race, about 10 percent having some Caucasian and about 1 percent some Mongolian antecedents.

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(1) Records, Public Works Department, American Samoa, 1951.
(2) U. S. Census, 1950.
(3) Annual Report, Public Health Department of American Samoa, 1950.

Communication with the outside consists of weekly or biweekly sailings by interisland vessels to Apia, Western Samoa, and occasional visits by steamships from Honolulu, the United States, and the Antipodes. Formerly there were frequent flights by U. S. Navy planes from Honolulu.

The island of Tutuila, in which all of the recorded cases of leprosy have occurred, is about twice the size of Manhattan island. It is long and narrow, and is cut almost in two by the great Pago Pago Bay. Owing to its central mountain ridge, all villages, with one exception, are located on the flat coastal lands. Since the use of Pago Pago Bay during the last century as a coaling station, and later as a Naval Station, the population has tended to gravitate to that area.

METHOD OF STUDY

The data to be presented were collected from (1) family and contact histories of all available patients, (2) records of the Public Health Department, (3) visits to the residences of known patients, (4) interviews with older residents, who were personally acquainted with former patients, including deceased patients, and (5) consultation with the sanitary inspector, Afioga (High Chief) Sotoa, who placed his large geneologic knowledge at the disposal of the Public Health Department, and rechecked his recollection of the earlier patients, all of whom he knew, by visits to their homes and families. Because of this multilateral approach to the problem, and because of the small size of the area and of the population involved, the data are believed to be highly accurate.

INTRODUCTION OF LEPROSY INTO AMERICAN SAMOA

There is a legend that leprosy was introduced into Samoa prior to the year 1900 by an escaped Hawaiian patient, who is said to have landed at Pago Pago and then to have fled to Upolu, Western Samoa, where he died. It was impossible to verify this tale, although it is entirely possible that there was such a person. Assuming its truth, there is no evidence that he infected persons in American Samoa, and there is evidence to the contrary.

It is generally accepted that the disease was introduced into South Sea islands by Oriental immigrants who followed the Caucasians into the area in the nineteenth century *(4)*. Krämer noted the presence of leprosy in Western Samoa in the 1890's *(5)*. According to official reports published in 1913 *(6)* and in

(4) Rogers, L., and Muir, E.: Leprosy. 3d edition. Williams & Wilkins Co., Baltimore, Md., 1946. pp. 8-9.

(5) Krämer, A.: Die Samoa Inseln. E. Nagele, Stuttgart, 1903. p. 14.

(6) American Samoa, A General Report by the Governor. U. S. Government Printing Office, Washington, D. C., 1913.

TABLE 1. *The recorded cases of leprosy in American Samoa*

Patient	Age (years)	Sex	Year diagnosed	Type of disease*	Means of infection	Current status
1	24	M	1917	Unknown	Unknown	Unknown
2	21	F	1919	Lepromatous	Unknown	Deceased
3	27	M	1921	Unknown	Unknown	Deceased
4	20	F	1933	Unknown	Household	Deceased
5	16	F	1934	Unknown	Household	Deceased
6	16	F	1934	Tuberculoid	Household	Makogai**
7	18	F	1934	Unknown	Household	Deceased
8	24	M	1936	Unknown	Household	Deceased
9	48	F	1939	Tuberculoid	Household	Arrested
10	20	M	1942	Tuberculoid	Household	Makogai**
11	19	M	1942	Lepromatous	Household	Makogai**
12	26	M	1942	Lepromatous	Extrafamilial	Makogai**
13	16	F	1942	Lepromatous	Household	Makogai**
14	14	F	1943	Lepromatous	Extrafamilial	Makogai**
15	36	F	1944	Lepromatous	Extrafamilial	Makogai**
16	9	F	1944	Unknown	Household	Deceased
17	60	F	1944	Tuberculoid	Household	Arrested
18	54	M	1945	Uncharacteristic	Household	Makogai**
19	16	M	1945	Lepromatous	Household	Makogai**
20	35	M	1945	Lepromatous	Household	Makogai**
21	49	F	1945	Unknown	Unknown	Deceased
22	45	F	1945	Unknown	Household	Arrested
23	64	M	1945	Tuberculoid	Extrafamilial	Makogai**
24	22	M	1946	Tuberculoid	Household	Makogai**
25	26	M	1946	Lepromatous	Extrafamilial	Makogai**
26	18	M	1946	Tuberculoid	Household	Makogai**
27	24	M	1947	Unknown	Extrafamilial	Carville, La.**
28	22	F	1947	Tuberculoid	Extrafamilial	Outpatient
29	26	F	1949	Lepromatous	Household	Makogai**
30	17	F	1949	Lepromatous	Household	Makogai**
31	13	F	1949	Lepromatous	Household	Makogai**
32	15	F	1949	Lepromatous	Household	Makogai**
33	21	M	1949	Tuberculoid	Extrafamilial	Outpatient
34	15	M	1949	Tuberculoid	Household	Makogai**
35	17	M	1949	Lepromatous	Household	Makogai**
36	13	M	1949	Lepromatous	Household	Makogai**

TABLE 1. *The recorded cases of leprosy in American Samoa*—Continued

Patient	Age (years)	Sex	Year diagnosed	Type of disease*	Means of infection	Current status
37	13	M	1949	Tuberculoid	Household	Makogai**
38	26	M	1949	Tuberculoid	Unknown	Outpatient
39	40	F	1950	Uncharacteristic	Household	Makogai**
40	26	M	1950	Lepromatous	Household	Makogai**
41	36	F	1950	Lepromatous	Household	Makogai**
42	44	M	1950	Tuberculoid	Extrafamilial	Makogai**
43	16	F	1951	Lepromatous	Extrafamilial	Makogai**
44	13	F	1951	Tuberculoid	Extrafamilial	Makogai**
45	10	M	1951	Uncharacteristic	Extrafamilial	Makogai**

*Older diagnoses have been converted to Pan-American terminology, perhaps arbitrarily.
**In leprosarium.

1916 (7), it was unknown in American Samoa at the time. The weight of the evidence uncovered in this study suggests that it was probably not overlooked.

There is consequently little doubt that leprosy came into American Samoa from Western Samoa, being introduced either by Chinese immigrants or by the legendary Hawaiian. A review of the available information leads to the conclusion that case 1 (table 1) was without epidemiologic sequelas, but that cases 2 and 3 share the responsibility of having brought in and disseminated the disease.

CASE REPORTS

Case 1. A man of mixed Samoan-European ancestry, was born in Apia, Western Samoa, in 1895. He lived in Tonga from 1910 to 1915, then returned to Apia. He came to American Samoa in 1916. He was recognized to have leprosy in 1917, and was returned to Western Samoa, whence he was sent to the Central Leper Hospital, Makogai, Fiji. During his brief stay in American Samoa he did not marry, and the family with which he resided has long since moved away. There is nothing to connect him with later cases. He was discharged from Makogai as arrested in 1938. His present status is unknown.

Case 2. A woman was born in Western Samoa in 1897. She came to Pago Pago, American Samoa, in 1918 as a bride. She divorced her husband and moved to the village of Utulei (it is

(7) American Samoa, A General Report by the Governor. U. S. Government Printing Office, Washington, D. C., 1916.

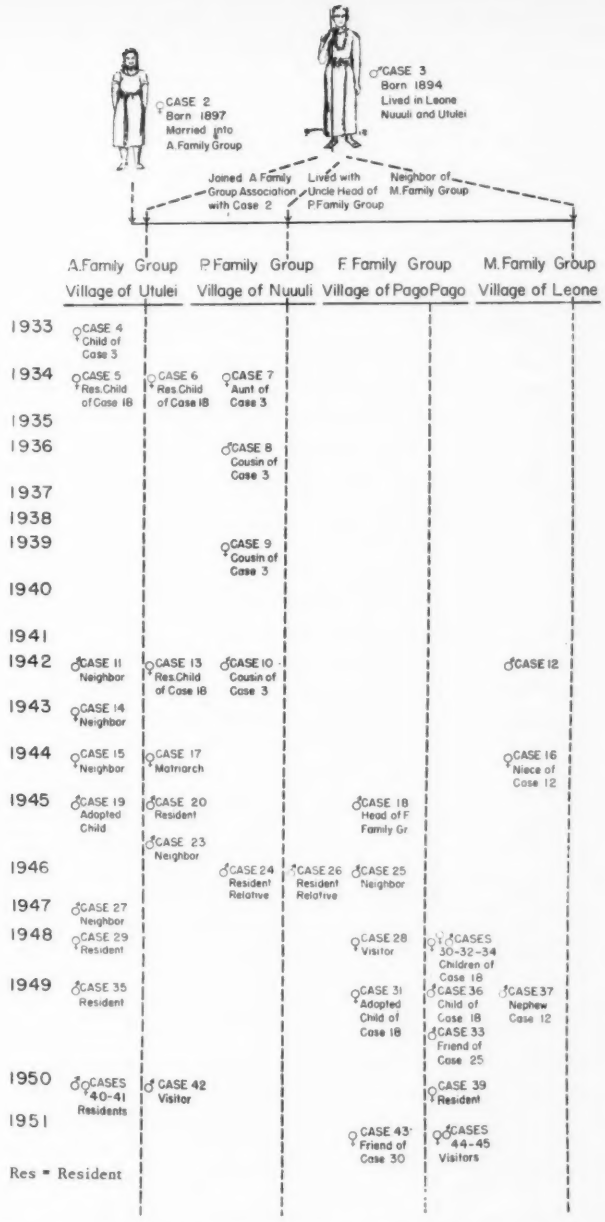

Figure 1. Diagram showing known spread of leprosy in American Samoa.

said that her neighbors recognized her leprosy and forced her to move), where she married into the "A" family group. In this group she was presently joined by case 3 (fig. 1). The diagnosis of leprosy was made in 1919, but she was not isolated until 1926 *(8)*. She remained at the Hospital of American Samoa until her death in 1944.

Case 3. A man was born in the American Samoan village of Leone in 1894, but passed his childhood in Western Samoa. The exact date of his return is unknown, but he was living in American Samoa in 1921 when he was found to have leprosy. He was isolated at the Hospital in 1927 *(8)*. In the meantime, he had lived in Leone, Nuuuli, and Utulei. In Leone he was a next-door neighbor to the "M" family group (cases 12, 16, and 37); in Nuuuli he resided with his uncle who was head of the "P" family group (cases 7, 8, 9, 10, 24, and 26). In Utulei he joined the "A" family group, the largest single source of subsequent cases.

These 3 family groups accounted for 41 of the 45 recorded cases in American Samoa. From the facts as stated, the conclusion that cases 2 and 3 were the joint initial vectors seems warranted.

SPREAD OF LEPROSY

In order to make the spread of leprosy in Samoa intelligible, it is necessary to describe the organization of Samoan society. The social unit is not the biologic family (father, mother, children, et cetera) but the family group, which is presided over by a chief, who is not only regarded as the head of the family group, but is referred to as the "father." His wife may be introduced as "the mother of our family." The family group lives in one or more dwellings, and consists of the chief and his wife, their children, and their children's wives (sometimes husbands), grandchildren, junior siblings of the chief with or without families, adopted children, other resident relatives, and non-relatives who, for one reason or another, join the group. The situation may be very roughly compared to the ante-bellum plantation in Southern United States, where the owner often provided a home for relatives, tutors, technicians, and visitors as well as for his immediate family.

It had already been shown how case 2 moved into the "A" family group in the village of Utulei, which stands at the western side of the entrance to Pago Pago Bay, and how case 3 lived at first in Leone, a lovely village near the western end of Tutuila, and later at Nuuuli, and finally joined the "A" family

(8) Annual Report, Public Health Department of American Samoa, 1928.

group in Utulei. It remains to explain the extension of the disease to the village of Pago Pago, about 2 miles distant from Utulei, at the head of the bay.

The focus in Pago Pago began as a branch of the "A" family group—case 18, who was born about 1890, in Pago Pago, but resided with the "A" family group in Utulei from about 1920 until 1940. In 1940 he was elected chief of the "F" family group of Pago Pago, and moved back to that village, taking his family with him. Three of his children (cases 5, 6, and 13) had already been found to have leprosy, case 5 having died. In 1945 a diagnosis of leprosy was established in case 18. Later 4 more of his children and an adopted child, as well as several neighbors and residents, contracted the disease.

Figure 1 attempts to present the known spread of leprosy in American Samoa graphically in terms of time and of the family groups involved. There were only 4 patients (cases 1, 21, 22, and 38) who could not be fitted into this scheme. The other 41 all fall readily into place because of known consanguinity, residence, frequent visitation, or frequent and intimate contact, alone or in some combination. The vertical lines in the chart are to be regarded as lines of infection and not as family trees. Case numbers and the sex of the patients are indicated to the right and left of the verticals, and a word or two indicating the nature of the patient's connection with the family group concerned is added.

The data depicted in figure 1 show (1) the time lag between the recognition of cases 2 and 3 and of the secondary cases of the early 1930's, and the further time lag between these cases and the group of cases in the 1940's which probably correspond to the long incubation period of leprosy *(9)*; (2) the danger involved in household contacts with patients and the tendency of the disease to spread in families; (3) the principal means of control, namely observation of household contacts; and (4) the relative safety of persons not closely connected with vector families in view of the fact that 41 of the 45 patients registered at time of the conclusion of this study, are included in 3 family groups, and 1 branch.

FACTORS AFFECTING THE SPREAD OF LEPROSY

Certain factors are known to favor the spread of leprosy in a community; others *may* favor spread; and still others retard dissemination *(10)*.

(9) Doull, J. A.: Studies on epidemiology of leprosy. Proc. Internat. Cong. Trop. Med. & Malaria. 1: 148-165, 1948.

(10) See footnote reference *(4)*.

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Factors favoring spread

1. *Climate.* Leprosy thrives in a warm, moist climate, such as that found in Samoa.

2. *Population density.* The average population density, calculated from the 1950 census figures, and area is 244.7 per square mile. Because most of the total area is uninhabitable, it is much greater than this in the inhabited areas.

3. *Changing social organization.* Leprosy flourishes in a community wherein an old tribal organization is breaking down and in which a so-called modern social organization is as yet incomplete *(11)*. Exactly this situation prevails in American Samoa. The indigenous unit of society, the family group, is strongly ingrained in Samoan law and custom, but contact with western monetary economy is diluting this system. In the field of public health, the result is that the chief tends to surrender some of his authority to the health department, although the department is not as yet backed by a community fully aware of the value of preventive medicine. Happily, with improving education, this gap is rapidly narrowing.

Factors probably favoring the spread

1. *The barefoot habit.* Most Samoans do not wear shoes, and their feet and lower legs (especially those of the children) are constantly subject to traumatic breaks in the skin, which may act as portals of entry for *Mycobacterium leprae.*

2. *Insects.* A number of insects have been regarded as possible vectors of leprosy. Flies, head lice, cockroaches, and the mite of scabies are common in Samoa.

3. *Dermatoses.* Minor dermatoses may create breaches in the skin through which more serious infectious agents may enter. In American Samoa pyodermas and fungus infections are common, especially in children.

Factors which retard the spread of leprosy

1. *Good economic conditions.* Although the annual per capita income is low by continental standards (it was estimated to be $96 in 1949) *(12)* the pastoral society, abundance of food, warm climate, and simple clothing and housing requirements, together with the indigenous social security system, by which family groups care for their own,

(11) Muir, E.: Manual of Leprosy. Williams & Wilkins Co., Baltimore, Md., 1948. p. 146.

(12) Annual Report, Public Health Department of American Samoa, 1950.

render destitution unknown and money relatively unimportant. Necessities are available and poverty is not a factor in the spread of disease.

2. *Education.* With 27 percent of the population enrolled in a school system which includes primary and secondary levels, and with literacy in the Samoan language 100 percent, the education level is rapidly rising. The result can only be to create an atmosphere unfavorable for a disease which thrives on ignorance.

3. *Available medical service.* Beginning in 1900, the U. S. Navy supplied the Samoans with medical services at far below cost. The annual per capita expenditure for health in 1949 was $15.99, of which the Navy contributed about two-thirds. An index of Samoan satisfaction with medical treatment is the large annual admission rate to the Hospital of American Samoa. In 1950, 2,771 persons (14.9 percent of the entire population) were hospitalized. It is the announced intention of the Department of the Interior, which has succeeded the Navy in administrative responsibility, to maintain a high standard of medical service.

Thus although climate, population density, and changing social organization favor the spread of leprosy, and although a number of factors possibly favoring spread exist, economic conditions, the state of popular education, and acceptance of available medical service militate against it.

CHARACTER OF THE DISEASE

The character of leprosy in a community is measured in terms of observations which indicate both status and trends. These are the type rate, age rate, sex rate, race incidence, class incidence, and contact rate *(13)*. The ascertained values establish a norm for the particular place. Changes over the years are significant as they indicate improvement or worsening of the situation. Because this is the first occasion on which these rates have been established for American Samoa, they have value only as a base line with which future findings may be compared.

Type rate. Ten of the case records do not indicate the type of disease found. The type distribution among the other 35 patients is shown in table 2.

Age rate. The age distribution of the patients at the time of diagnosis is shown in table 3. The rate for persons less than 15

(13) See footnote reference *(11)*. pp. 13-17.

years of age is 15.5 per hundred. Leprosy was recognized chiefly among youths and young adults.

Sex rate. Of the 45 patients, 23 were male and 22 female.

TABLE 2. *Type of leprosy encountered*

Type	Number	Percent
Lepromatous	18	51.4
Tuberculoid	14	42.8
Uncharacteristic	3	5.8
Total	35	100.0

Race incidence. The population of American Samoa is composed of Polynesians, Caucasians, and so-called "half-castes." Thirty-eight of the patients were Polynesian, and 7 were of mixed Polynesian-Caucasian ancestry. The small Caucasian population, consisting mostly of naval personnel and their families, has, as far as is known, remained entirely unaffected.

TABLE 3. *Age distribution of patients*

Age group (years)	Number
5 - 9	1
10 - 14	6
15 - 19	12
20 - 29	15
30 - 39	3
40 - 49	5
50 - 59	1
60 and over	2
Total	45

Class incidence. Samoan society is classless. There are, however, a few persons engaged in mercantile pursuits or holding superior positions in the government who, with their families, are relatively affluent. That such status has not protected them from leprosy is shown by the fact that 4 of the patients were members of such families.

Contact rate. Twenty-eight patients probably acquired leprosy as a result of household contacts and 12 as a result of extrafamilial contacts. In 2 patients the contact relationship was unknown (cases 1, 2, and 3 are omitted from this consideration).

This gives a household contact rate of 66.6 per hundred and an extrafamilial rate of 28.6 per hundred.

General incidence. Thirty-six of the known patients were living at the time of writing. This gives a general morbidity of 1.94 per thousand. The relatively high lepromatous rate and the low childhood rate suggest that general community hygiene is good and that the disease is on the wane. Although increasing population bears out good community hygiene (it increased from 5,679 in 1900 to 18,602 in 1950), the recently observed increase in the number of patients with leprosy indicates waxing rather than waning of the disease. Several years of observation will be necessary before a trend can be demonstrated.

CONTROL MEASURES

Measures for the control of leprosy include (1) creation of a community consciousness of the problem, (2) case finding, (3) isolation of the contagious, and (4) treatment *(14)*.

Community consciousness. An enlightened community will not tolerate an unnecessary disease. Although American Samoa is in a transitional stage of social organization, the community is already aware of the importance of leprosy. In 1950 when a Samoan Committee undertook to raise funds for Christmas gifts to the leprous patients, 1,081 donors, (about 1/10 of the adult population) responded. This indicates a popular interest in the problem which needs only intelligent guidance to be highly useful in the control program. One of the objectives of the Committee was the molding of such effective public opinion. Public Health Department planning must take account of this important factor.

Case finding. The positive phase of leprosy control includes the early detection of the patient at a time when treatment is most likely to be effective and when the danger to the public health is least. The case-finding methods locally applicable include an extensive survey in the form of the legally required annual physical examination of school children and the examination of contacts of known patients.

The school population was subjected to a physical examination, a deliberate part of which was a search for leprosy. The number of children examined was 4,325. Although no leprosy was found, 3 children were admitted to the hospital with leprosy, in each case ahead of the examination of their particular schools. These facts almost certainly indicate the urgent need for a screening test for leprosy comparable to the tuberculin test.

(14) See footnote reference *(11)*, p. 143.

On the other hand, they show that frank leprosy in the school population is inconspicuous.

Forty-four contacts of known patients were examined in the first months of 1951. Although this number of examinations is far below the desirable standard of 5 contact examinations per patient *(15)*, it is a beginning, and the method will be extended. The difficulty with the contact examination is the same as the difficulty with the examination of school children, namely the lack of a screening test. With a disease of such a long incubation period as leprosy, a single examination of a contact is almost useless. Thus if a patient is admitted to the hospital today, his contacts examined tomorrow may all be negative, although over the course of several years a number of them may develop clinical disease. The solution projected for this problem is a register of contacts with annual examination of each person listed.

TABLE 4. *Current status of known patients in American Samoa with leprosy*

Status	Number
Isolated at Makogai, Fiji	29
Isolated at Carville, La.*	1
Returned arrested from Makogai	3
Under outpatient treatment and observation	3
Total	36

*This man, case 24, migrated to the United States after World War II, was found to have leprosy, and was sent to the U. S. Marine Hospital, Carville, La. At last report he was still there.

Isolation. It is axiomatic that the victim of any contagious disease must be isolated until the period of his infectivity is over. In leprosy the criterion of infectiousness is simple: either *Myco. leprae* is consistently found in scrapings from the lesions or it is not. On the basis of this test, together with attempted individual prognosis, disposition is arranged. The current status of the 36 known living patients of American Samoa is shown in table 4.

Prolonged isolation in American Samoa is impracticable. Leprosy is a disease of low toxicity, on the whole, and of

(15) Casile, M.: L'Organisation Générale du Service National de la Lèpre au Brésil. Méd. Trop. 9: 536-560, July-Aug., 1949.

tediously long duration. All patients, therefore, deserve a chance to have local liberty while under treatment, especially children who deserve a chance to go to school and to develop normally with their contemporaries. The creation of a suitable leprosarium in islands with a total population of 18,602 is economically out of the question, and the available isolation facilities are no more than those of a receiving and holding station. Therefore, since 1944 selected patients have been sent to the Central Leper Hospital at Makogai, Fiji, an institution equipped to serve the needs of the South Pacific area in general. Located on a large island in surroundings similar to those of Samoa, Makogai offers ample space, air, and occupation to the patients. All patients with lepromatous and uncharacteristic lesions are sent to Makogai as soon as possible after diagnosis; those with tuberculoid lesions, owing to their generally lesser infectivity, are individualized according to bacteriologic and prognostic criteria. Patients who are bacteriologically positive and who will probably require prolonged treatment are dispatched to Makogai. Patients with mild leprosy who are bacteriologically negative are assigned to outpatient treatment and observation. They are subject to hospitalization should circumstances require. Patients discharged from the leprosarium are also subject to re-examination.

The wisdom of permitting any patient to go at large, except after prolonged isolation, is open to question. In Samoa it is an idle gesture to interdict contact with children or even marriage and the procreation of children, all potential future cases. Nevertheless, it must be admitted that outpatient treatment is accepted good practice *(16)*, and that it is psychologically sound. Furthermore, it is evident that patients are more likely to report early for treatment if they know that diagnosis does not necessarily mean prolonged isolation. The choice is between 2 evils, with nonisolation of suitable patients with tuberculoid lesions as probably the lesser.

Treatment. Although a discussion of epidemiology is not an appropriate place in which to comment on treatment, the improved outlook in leprosy due to the sulfone drugs is significant from the point of view of the public health. To some extent these drugs justify occasional outpatient treatment and observation. Their exact value epidemiologically remains undetermined *(17)*.

COMMENT

From the foregoing it is evident that the main foci of leprosy in American Samoa are known and that leprosy control must be

(16) See footnote reference *(11)*, p. 162.

(17) Austin, C. J.: Use of Sulfones in Leprosy. First Conference of the Leper Trust Board (New Zealand), Christchurch, 1950.

centered about them. With increasing public appreciation of the importance of the problem, with available means for proper isolation, and with the use of repeated contact examinations and annual examinations of school children, the outlook is hopeful. Austin *(17)* has pointed out that for the next few years the population at leprosariums is likely to increase, but that eventually a decline should be apparent. This is the expected course of events in American Samoa.

SUMMARY

Leprosy is a major public health problem in the islands of American Samoa. The morbidity is 1.94 per thousand. The character of the disease is presented as a base line for future comparisons.

BOOK REVIEW

Body Temperature, Its Changes with Environment, Disease and Therapy, by *W. A. Selle,* Ph. D., Professor of Biophysics and Physiology, University of California Medical School, Los Angeles, Calif. American Lecture Series, Publication No. 147, A Monograph in American Lectures in Physical Medicine. Edited by *W. A. Selle,* Ph. D., Professor of Biophysics and Physiology, University of California Medical School, Los Angeles, Calif.; Formerly, Professor of Medical Physics and Director of Postgraduate Courses in Physical Medicine, University of Texas Medical Branch, Galveston, Tex. 112 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1952.

This book is primarily designed for physiatrists. In it the author presents the classical physiology of heat and cold regulation and of the effects of thermal variation on the body. Unfortunately, publishing time lags apparently have so limited his presentation that many of the newer concepts are omitted. In the compilation of this monograph for high-level graduate students and aspirants for certification by the American Board of Physical Medicine, several references were either missed or arbitrarily omitted as interjecting impertinent or controversial themes. In spite of the fact that 222 references are cited, this book cannot be regarded as a complete compendium of information for the scientist, researcher, or advanced student of body temperature.—*A. H. Lawton, M. D.*

ROENTGENOGRAPHIC SIGNS OF INTESTINAL PARASITIC INFESTATION

A Case Report *(1)*

LEWIS E. ETTER, *M. D. (2)*

LAWRENCE C. CROSS *(3)*

IN the course of a gastrointestinal series performed on an American veteran of the Korean campaign who had a shell fragment in his abdomen, no abnormality was noted in the stomach or duodenum. During inspection of the roentgenograms of the small bowel, our attention was drawn to an abnormal, thin, comma-shaped collection of barium in the left lower abdominal quadrant on the 6-hour film (fig. 1). We then looked over the remainder of the roentgenograms and saw a linear shadow of lessened density on both the immediate and the 2-hour films, one of which corresponded quite well with the position of the radiopaque shadow described above, and which was probably in the jejunum (fig. 2). We recalled that Garland *(4)*, Weir *(5)*, and Lofstrom and Koch *(6)* reported on the diagnosis of ascaris infestation by serial roentgenographic examination of the small intestine. We therefore made a presumptive diagnosis of infestation of the small bowel, probably by *Ascaris lumbricoides*, and asked the patient to return for re-examination.

A gastrointestinal series was made about 2 months after the first examination and the outline of the body of the worm was then

(1) Reviewed in the Veterans Administration and published with the approval of the Chief Medical Director. The statements and conclusions published by the authors are the results of their own study and do not necessarily reflect the opinion or policy of the Veterans Administration.

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(4) Garland, L. H.: Tropical diseases of interest to radiologist. Radiology 44: 1-13, Jan. 1945.

(5) Weir, D. C.: Roentgen diagnosis of ascariasis in alimentary tract. Radiology 47: 284-286, Sept. 1946.

(6) Lofstrom, J. E., and Koch, D. A.: Diagnosis of ascaris infestation by serial roentgen examination of small intestine. Am. J. Roentgenol. 57: 449-452, Apr. 1947.

Figure 2.

Figure 1.

located in the right lower abdominal quadrant (fig. 3). A ropelike defect displaced the barium in the ileum and conformed to the presumed shape of a round worm. A complete blood count was made on this man at each visit but stool examinations were not done. No eosinophilia was noted.

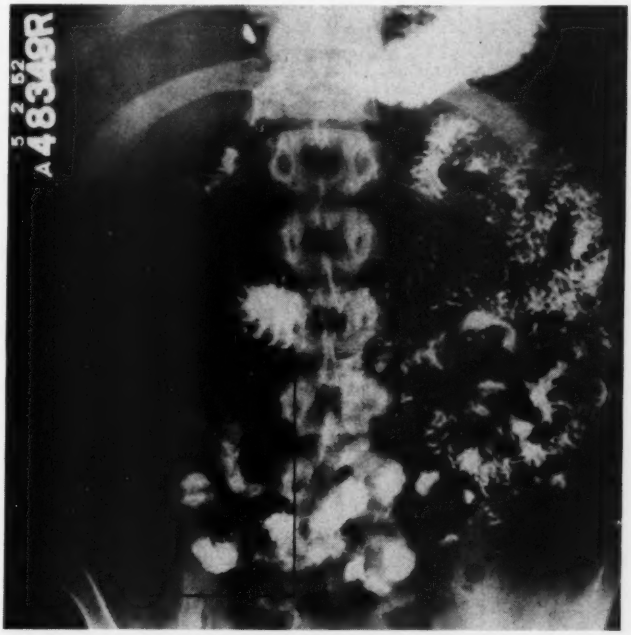

Figure 3.

After the second visit the man was given 5 anthelmintic pills, each containing 0.2 gm. of hexylresorcinol, and asked to watch his stools for evidence of worms. He promptly passed a nonviable male ascaris measuring almost 11 inches in length and about 1/4 inch in diameter.

Comment. A filiform collection of barium such as that shown in figure 1 in the left lower abdominal quadrant is suggestive of barium in the intestinal tract of a worm. When associated with a linear shadow of lessened density, such as was seen in figures 2 and 3, the diagnosis is practically confirmed. Lofstrom and Koch did not see barium within the worm on their 24-hour films. Perhaps it had already been evacuated by that time. Even without this additional sign, however, the coiled linear filling defect seen in the barium-filled small bowel is probably diagnostic of intestinal parasitic infestation.

BOOK REVIEW

Problems of Consciousness, Transactions of the Third Conference, March 10 and 11, 1952, New York, N. Y., edited by *Harold A. Abramson,* M. D., Associate Physician for Allergy, Mt. Sinai Hospital, New York, N. Y. 156 pages; illustrated. Sponsored by the *Josiah Macy, Jr. Foundation;* printed by Corlies, Macy & Co., Inc., New York, N. Y., publishers, 1952. Price $3.25.

This conference, with an all-star cast as usual, discussed 3 topics. Kety, in the chapter entitled "Consciousness and the Metabolism of the Brain," told of the "machinery of behavior" in a semitechnical fashion, using mechanical, thermal, chemical, and electronic models to illustrate the processes of thinking, consciousness, and behavior. The second topic was "Hypnotic Phenomena," in which Wolberg presented a recording of a hypno-analytic session and a motion picture entitled "Unconscious Motivation." The latter consisted of a hypnotically induced conflict simultaneously produced in a man and a woman. They were subsequently induced hypnotically to dream, daydream, look at Rorschach blots, and TAT cards, and to respond to word association cues. Together they analyzed the content of the conflict, but there was a significant difference in the approach of the man and of the woman to their guilty memories, the woman tending to lay the blame on the man.

Monnier, in an important paper on "Experimental Work on Sleep and Other Variations of Consciousness," introduced the definition of consciousness as "a system which transcribes into signs philosophic patterns elicited in the sense organs and in the brain by outer physical events" and stated that "these signs express relationships between outer physical events, and they have a signification for the individual." There was a great deal of discussion of various types of cerebral ablation, and Monnier presented the hypothesis that there is more transportation of signs than has been previously assumed and that at subcortical levels there are probably some "integrative codified evaluatory functions." The discussion throughout was keen and provocative. It raised many more questions than were answered. The volume emphasizes the worth-whileness of interdisciplinary research and communication. This book should be of special interest to physiologists, neurologists, psychiatrists, psychologists, and other students of human behavior.

—Lt. (jg) E. A. Loomis, Jr., MC, USNR

EXTENSIVE RUPTURE OF SPLEEN WITH DELAYED SIGNS OF HEMORRHAGE

CHARLES ATAMIAN, *Captain, USAF (MC) (1)*
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HENRY S. BLAKE, *M. D. (2)*

THE syndrome of delayed hemorrhage following traumatic rupture of the spleen was first described by McIndoe *(3)*. Since that time only small series of patients with this syndrome have been noted. Zabinski and Harkins *(4)* reported 4 patients with hemorrhage delayed from 4½ to 7 days (with 1 death). In Dobson's *(5)* series of 22 patients, signs of delayed hemorrhage occurred in 5. In our patient, 8 days elapsed before splenectomy was performed for a rupture measuring more than 5 cm. in depth and width.

CASE REPORT

A 36-year-old man was admitted to a civilian hospital following a 4-car collision in which he suffered a concussion and contusion of the brain and a fracture of the right clavicle. Shortly after admission, he regained consciousness but remained dazed and disoriented for several days. His only complaint during this period was pain in the region of the clavicle and diplopia. His left pupil was larger than his right, but both reacted to light. The remainder of the neurologic examination was negative but a subdural hematoma was suspected and the patient was placed under observation. Palpation of his abdomen revealed no tenderness or mass. Thirty-six hours after the accident his condition was considered satisfactory and he was transferred by ambulance to this hospital, a distance of 28 miles.

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(3) McIndoe, A. H.: Delayed haemorrhage following traumatic rupture of spleen. Brit. J. Surg. 20: 249-268, Oct. 1932.
(4) Zabinski, E. J., and Harkins, H. N.: Delayed splenic rupture; clinical syndrome following trauma; report of 4 cases with analysis of 177 cases collected from literature. Arch. Surg. 46: 186-213, Feb. 1943.
(5) Dobson, L.: Rupture of spleen with particular reference to delayed hemorrhage. West J. Surg. 58: 409-417, Aug. 1950.

No change occurred in his physical condition, vital signs, or laboratory findings until the eighth day following the accident, when he began to feel faint. His pulse rate suddenly increased from 80 to 110; his systolic blood pressure dropped to 90; and a red blood cell count of 2.6 million was recorded. Following a transfusion of whole blood, his vital signs returned to normal. He complained of dull, abdominal aching, unassociated with nausea, vomiting, or change in bowel habits. Examination again revealed a dilated left pupil without other neurologic signs. His abdomen remained soft but there was tenderness in all 4 quadrants on deep palpation. There was no bulging of his flanks, but shifting dullness indicated the presence of fluid in the abdominal cavity.

A diagnosis of ruptured spleen was made. Two additional transfusions of 500 cc. of whole blood were given and a laparotomy was performed. On opening the peritoneal cavity, about 1,500 cc. of fresh and clotted blood were found in the pelvis, subhepatic area, and the splenic region. No laceration of the liver was seen, but a ruptured spleen was detected by palpation. The incision was enlarged and the spleen removed. The postoperative course was marked by an atelectasis of the lower lobe of the right lung. This rapidly responded to treatment without the necessity of bronchoscopy.

DISCUSSION

This episode on the eighth day following injury indicated severe bleeding. The hemorrhage was believed to be limited to either the peritoneal cavity or the retroperitoneal space because there was no evidence of bleeding from the gastrointestinal tract, kidneys, or the cranial or chest cavities. The absence of back pain and the outline of the psoas shadows on a roentgenogram of the abdomen did not support retroperitoneal hemorrhage. A preoperative diagnosis of intraperitoneal hemorrhage with probable rupture of the spleen was made. The well-formed clots encountered at operation in the region of the rupture are believed to have prevented early profuse hemorrhage. Delayed hemorrhage can also result from rupture of the capsule following subcapsular hemorrhage.

DELAYED RUPTURE OF THE SPLEEN

A Case Report

PAUL J. KOWALLEK, Jr., *Major, MC, USA (1)*

A 21-year-old soldier was admitted to this hospital on 19 October 1952. He gave a history of sudden onset of mid-abdominal pain coming on immediately after his noon meal, associated with weakness, profuse perspiration, and nausea but no vomiting. When first seen, he complained of a generalized dull abdominal pain, aggravated by motion, which also caused a pain deep in the back of his neck on the left side. The neck pain bothered him as much as the abdominal pain and he lay in bed with his head elevated on a pillow, turned to the left side supporting his neck with his left hand. Movement of the neck, both active and passive, aggravated the pain.

His abdomen was moderately rigid, markedly tender, and rebound tenderness was slightly worse on the left. Almost continuous peristaltic sounds of normal character were heard. He was afebrile; his pulse was 80; and his blood pressure was 118/74. His leukocyte count was 10,500 with 80 percent polymorphonucleocytes. His hemoglobin was 10.5 grams. A KUB roentgenogram showed no significant findings.

Further questioning elicited the fact that the patient had been boxing 2½ days prior to admission and had sustained a severe blow on the left side of the back during the second round of a 3-round bout. He completed the fight without difficulty and was not particularly distressed by the blow. Between the time of the blow and his collapse, he was completely asymptomatic.

Much attention was given to the patient's neck pain. A complete neurologic examination was negative except for the pain on flexion of the neck. A decision was made to explore the abdomen because the evidences of peritoneal irritation were unmistakable and because of the low hemoglobin. The left upper abdominal quadrant seemed the most likely site of disease with a preoperative diagnosis of ruptured spleen or ruptured left lobe of the liver. The blood-free urine and normal temperature were considered reasonable evidence of a normal left kidney. Lumbar puncture was performed, the spinal fluid pressure and character

(1) U. S. Army Hospital, Camp Chaffee, Ark.

of the fluid were found to be normal, and a spinal anesthetic was administered.

A large amount of dark blood was found in the abdomen; 850 cc. were removed by aspiration and an additional estimated 500 cc. by gauze tapes and manual delivery of large clots. The left kidney and left lobe of the liver were normal to examination. The spleen was palpably enlarged and presented a large hematoma in its upper half. A hole about 2 mm. in diameter which exuded old blood freely whenever the spleen was moved was seen on its left, upper, lateral curvature. The spleen was removed, the estimated blood loss was replaced, and the patient's convalescence was normal.

BOOK REVIEW

Surgical Applied Anatomy, by Sir *Frederick Treves,* Bt.; 12th edition, revised by *Lambert Charles Rogers,* V. R. D., M. D., M. Sc., F. R. C. S., F. R. C. S. E., F. R. A. C. S., F. A. C. S., Professor of Surgery, University of Wales; Director of Surgical Unit, Cardiff Royal Infirmary; Surgeon, United Cardiff Hospitals; Surgical Consultant to the Royal Navy; Member of Council, Royal College of Surgeons of England; Formerly Member of Court of Examiners, Royal College of Surgeons of England; Prosector to the University of London and the Royal Colleges of Physicians and Surgeons and Examiner in Anatomy to the Conjoint Examining Board in London. 590 pages; illustrated. Lea & Febiger, Philadelphia, Pa., publishers, 1953.

This book was originally written in 1863 and is thought to be one of the oldest English texts on surgical anatomy remaining in current use. Its purpose is to provide a simple, yet practical review in anatomy for the general surgeon or surgical specialist. In this new edition, the sections on ear, nose, throat, eye, and orbit have been thoroughly revised. Sixty-six of the 206 illustrations are in color (mostly black and red). The type and illustrations are too small for comfortable reading and clearness. The text, however, is well organized and well written. The use of bold type to emphasize important points of interest is helpful. The footnotes concerning proper names and historical facts make a useful and entertaining addition to what is commonly thought to be a rather dry subject

—*Commander F. V. Berley, MC, USN*

TREATMENT OF EXFOLIATIVE DERMATITIS WITH CORTISONE

DONALD M. KOPPEL, *Captain, USAF (MC)* (1)

IN recent years the dramatic response of acute dermatologic conditions, both allergic and nonallergic, to cortisone and ACTH has been effectively demonstrated. Among the allergic dermatoses that have been benefited are angioneurotic edema, atopic dermatitis, rhus dermatitis, and exfoliative dermatitides, including those resulting from drug allergy. The nonallergic skin conditions include pemphigus, scleroderma, dermatomyositis, and disseminated lupus erythematosus. These hormones do not appear to alter the basic disease processes involved but, through their temporary palliative effect, they afford the patient prompt symptomatic relief and shorten the period of hospitalization (2, 3). External manifestations rapidly show regression or disappear and, in some instances, a probably fatal outcome may be prevented. The hormones are dramatic in their action and are often lifesaving agents. The patient is relieved from the distressing and unsightly manifestations of the disease, and itching subsides within a few hours. This is due almost exclusively to a reduction in the components of acute inflammation (4). Eruptions present for many years may regress partially or completely in a few days. Usually from 2 to 4 days of therapy with these hormones produces a remission. Unfortunately, most patients relapse when the drug is withdrawn (5); therefore, their greatest use is in diseases of limited duration in which remission may be prolonged sufficiently to permit natural evolution of the pathologic process. The hormones should be stopped before undesirable side effects, such as water retention, potassium depletion, hyperglycemia and glycosuria, hypertension, and mental disturbances, occur. Because

(1) 1605th Medical Squadron, U. S. Air Force.

(2) Hopkins, J. G.; Kesten, B. M.; Nelson, C. T.; Hambrick, G. W., Jr.; Jennings, R. G., Jr.; and Machacek, G. F.: Pituitary adrenocorticotropic hormone (ACTH) and cortisone in diseases of skin; allergic and other dermatoses; report of 67 cases. Arch. Dermat. & Syph. 65: 401-421, Apr. 1952.

(3) Berry, C. Z.: Use of ACTH in dermatoses. U. S. Armed Forces M. J. 3: 541-548, Apr. 1952.

(4) Steiner, K., and Frank, L.: Clinical experiences with cortisone and corticotropin (ACTH) in some cutaneous diseases. Arch. Dermat. & Syph. 65: 524, May 1952.

(5) Sauer, G. C.; Herrmann, F.; Milberg, I. L.; Prose, P. H.; Baer, R. L.; and Sulzberger, M. B.: Effects of ACTH on Certain Diseases and Physiologic Functions of Skin. In Mote, J. R. (editor): Proceedings of Second Clinical ACTH Conference; vol. 2. The Blakiston Co., Philadelphia, Pa., 1951. pp. 529-547.

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dangerous sequelas may appear on prolonged therapy, the problem of maintenance dosage and prevention of relapse in chronic disease is difficult. The side effects must be weighed carefully against the gravity of the disease under treatment.

CASE REPORT

A 58-year-old man complained of a scaling, nonpruritic eruption over the extensor surfaces of the elbows and knees. The onset was gradual and the duration 1 year. The eruption, either due to the spontaneous course of the disease or to aggravation by numerous ointments and lotions, spread slowly over the entire body during the 4 months prior to admission to the hospital. When first seen, the patient was anorectic, extremely weak and debilitated, dehydrated, and bedridden. His entire body was covered with a weeping, scaling eruption typical of the acute stage of exfoliative dermatitis, presumably due either to a severe exacerbation of psoriasis or to dermatitis medicamentosa (fig. 1).

The following schedule of intramuscular injections of cortisone was started immediately: (1) 100 mg. every 8 hours for 2 days, (2) 100 mg. every 12 hours for 8 days, (3) 100 mg. daily for 4 days, and (4) 50 mg. daily for 4 days (2,800 mg. in all). All other medication was discontinued. Starch baths were given twice daily to alleviate pruritus, and soaks with Burow's solution 1:20 were given twice daily to decrease the oozing. A low sodium diet was prescribed to prevent excessive water retention and edema. No added potassium was given, but the patient was observed carefully for signs of potassium depletion.

Laboratory studies revealed no significant changes in the fasting blood sugar, nonprotein nitrogen, urine, and leukocyte and erythrocyte counts during the course of therapy. The eosinophil count decreased from 350 per cu. mm. before the start of treatment to 200 per cu. mm. in a week. Blood pressure and weight remained constant throughout treatment. Electrolyte studies were not done because of inadequate laboratory facilities.

Marked improvement in both the dermatitis and the patient's clinical appearance was noted within 48 hours. After 8 days the lesions had completely disappeared, exfoliation was complete, and the patient's skin was soft pink (fig. 2). Cortisone was continued for another 10 days in gradually decreasing doses to prevent immediate relapse. The starch baths and Burow's solution soaks were discontinued after 1 week and lanolin ointment was substituted to prevent undue dryness of the skin.

The patient remained completely asymptomatic for about 2 weeks after the cortisone was discontinued, then the exfoliative dermatitis began to recur, and within another 5 days the lesions

were as severe as they had been prior to treatment. Another course of therapy was begun with the same initial doses as given previously. The present plan is to give the cortisone for a longer period with gradual diminution in dose over several weeks or months. At the time of writing, 2 months after the second course,

Figure 1. Appearance of patient before cortisone therapy was started. Figure 2. Appearance of patient after 3 days of cortisone therapy.

the patient was completely free of lesions on a maintenance dose of 100 mg. of cortisone daily. With any decrease below this level, the dermatitis has rapidly reappeared.

SUMMARY

In a patient with acute exfoliative dermatitis treated with cortisone, initial rapid response to the hormone occurred with complete disappearance of all lesions. Because prompt relapse occurred whenever the drug was discontinued, a daily maintenance dose of cortisone was required. This substantiates the findings of other authors that most diseases of this nature, although responding promptly to cortisone, relapse rapidly when the hormone is withdrawn. Those diseases which are self-limited in duration are benefited most by such therapy. The dramatic response produced by cortisone cannot be duplicated by other local or systemic therapy.

BOOK REVIEW

The 1952 Year Book of Drug Therapy (August 1951-August 1952), edited by *Harry Beckman,* M. D., Director, Departments of Pharmacology, Marquette University Schools of Medicine and Dentistry; Consulting Physician, Milwaukee County General and Columbia Hospitals, Milwaukee, Wis. 606 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1952. Price $5.50.

This book consists of abstracts of articles on the use of medicinal agents published during the period August 1951 to August 1952. The abstracts are quite complete and contain a large number of graphs, tables, and pictures. With the exception of antibiotics and sulfonamides, the contents are arranged according to specialty fields such as allergy, dermatology, ophthalmology, et cetera. The editor's comments are especially interesting and helpful. The subject matter deals primarily with the newer drugs the use of many of which is still experimental. This book should be of value to anyone in the various fields of medicine who desires to keep abreast of the rapid advances in drug therapy.—*Capt. J. W. McNamara, MSC, USA*

THE ITINERANT DEPENDENT AND MEDICAL RECORDS

HERMANN J. LUKEMAN, *Commander, MC, USN (1)*

THE immediate availability of the Health Record for review in the case of military personnel does not prevail in the case of dependent patients. At times this lack is keenly felt. Examples can be cited of innumerable instances in which the prompt perusal of past medical data would have helped the medical officer in reaching an earlier diagnosis and in the institution of earlier therapy. Some routine bugbears are:

The scarred abdomen. The patient with abdominal pain and a low midline scar often has no knowledge of what was done at the time of the celiotomy, particularly as to whether or not the appendix was removed.

The extensive work-up. The patient who comes from a far corner of the globe has, in many cases, had a recent, complete clinical study, but is utterly ignorant of the results. Waiting a long time for a report (which may never arrive) is about as unsatisfactory to the patient as a repetition of her tests. Costly repetitive testing consumes the doctor's and the patient's time and the taxpayer's money. Likewise it does not build a healthy rapport between the patient and the medical service.

The psychoneurotic. Before one is condemned to such a diagnosis, all organic possibilities must be ruled out. It is just such a patient who may be harmed by repeated tests.

The pediatric problem. Little need be said here. Repetition of a child's work-up can disrupt any clinic.

It is suggested, therefore, that whenever an operation is performed, a difficult delivery carried out, or an extensive medical or other study made, the medical officer convey this data concisely, in writing, to his patient. This is done routinely on our obstetrical and gynecologic service. The following letter is an example.

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(1) U. S. Naval Hospital, Portsmouth, N. H.

Mrs. John Doe (Jane)
123 First Street
Anywhere, U. S. A.

Dear Mrs. Doe:

This letter is sent you for any possible future use you may have for it. You were admitted to this facility on _____, operated on _____, and discharged on _____, ambulatory, and in good condition.

The procedure was done under spinal anesthesia and consisted of total hysterectomy with bilateral salpingo-oophorectomy for "fibroids." The appendix was removed at the same time. You received 500 cc. of whole blood during the procedure. The anesthesia, operation, and transfusion were carried out without any untoward incident.

The pathologic report on the removed organs confirmed our clinical impression.

Sincerely yours,

(Signed) H. M. Medico, Commander, MC, USN

It is suggested that each activity make up flexible forms to facilitate the handling of such data.

CONCLUSION

The use of a record such as that herein suggested would be a valuable adjunct to the care of dependents.

THE OCULAR-MUCOUS MEMBRANE SYNDROME[1]

J. J. FALSONE, *Captain, USAF (MC)*
EDWARD H. FERGUSON, *Captain, USAF (MC)*
HENRY B. WILSON, *Captain, USAF (MC)*

ROBINSON *(2)* has grouped together as the ocular-mucous membrane syndrome of erythema multiforme exudativum several conditions with numerous and confusing descriptive names, some of which may be synonymous. This syndrome is characterized by eye involvement ranging from mild conjunctivitis to keratitis with corneal ulcers and erosions. The mucosa of the oral cavity is usually studded with bullas, vesicles, ulcers, and pseudomembranes. The most common genitourinary manifestation is a purulent urethritis. Severe balanitis or ulcerative vaginitis may also be present. The skin lesions are symmetrical and occur most commonly on the dorsal surface of the hands and forearms. They consist of variants of macules, papules, vesicles, and bullas. A striking, if not pathognomonic lesion, is a papule or raised circular macule with a blue-gray center and an irislike appearance. Systemic involvement results in fever, joint pains, and pneumonitis. The latter has been responsible for the few deaths reported *(2)*.

The diagnosis is suggested when 2 or more of the above systems are involved but it is obscure when overt manifestations are seen in only 1 system. Robinson *(2)* believed that the cause of this symptom complex is a virus but that the use of barbiturates, coal tar derivatives, and penicillin are precipitating factors. Agostas et al. *(3)* believed that it is due to an allergy, possibly to the sulfonamides.

CASE REPORTS

Case 1. A 20-year-old man was admitted because of "sore gums" and "sores" of his tongue and mouth of 3 days' duration. During this time there was a discharge from his eyes. On the morning of admission a rash appeared on his arms and legs, and

(1) From the U. S. Air Force Hospital, Elmendorf Air Force Base, Alaska.

(2) Robinson, H. M., Jr.: Ocular-mucous membrane syndrome. M. Clin. North America 35: 315-331, Mar. 1951.

(3) Agostas, W. N.; Reeves, N.; Shanks, E. D., Jr.; and Sydenstricker, V. P.: Erythema multiforme bullosum (Stevens-Johnson syndrome). New England J. Med. 246: 217-219, Feb. 7, 1952.

a urethral discharge was noted. One week prior to hospitalization he had an upper respiratory infection for which he received aspirin-phenacetin-caffeine capsules. No history of exposure to venereal disease was obtained. A similar rash had appeared on his hands and arms 10 years earlier. This lasted 1 week but was unaccompanied by other symptoms.

His temperature on admission was 100° F. His lips, buccal mucosa, and tongue revealed multiple, shallow ulcerations covered with a purulent exudate. The areas around the ulcerations were reddened. There was a rash on the dorsum of his forearms and hands which consisted of raised circular erythematous areas 2 cm. by 2 cm. with slightly depressed blue-gray centers. They were irislike in appearance. (The rash soon spread to the palms, volar surface of the forearms, and extensor surface of the legs.) The glans penis was erythematous and ulcerated and there was a mucopurulent uretheral discharge. Examination of the eyes showed a mild purulent conjunctivitis. His leukocyte count was 13,800 with 76 percent polymorphonucleocytes, but returned to normal within 1 week.

Treatment was started immediately. Four grams of aureomycin hydrochloride was given daily in divided doses. Local therapy consisted of hydrogen peroxide mouthwashes and boric acid soaks to the glans penis. On the fourth day of hospitalization the patient was unable to eat and his mouth was practically closed with hardened exudate. His glans became so denuded of skin that sloughing of the part was feared. On the sixth hospital day he showed remarkable improvement. The low-grade fever subsided and all lesions showed healing. There was only a residual pigmentation on the skin by the fourteenth hospital day. The aureomycin dosage was decreased gradually and discontinued in the third week after admission. The patient was discharged as recovered.

Case 2. A 22-year-old man was admitted complaining of itching and a purulent discharge from his eyes. He had been given penicillin parenterally and "some ointment" several days prior to admission. The past history revealed an allergy (urticaria) to strawberries and a gonorrheal infection 8 months prior to admission. Seven months prior to admission he had a mild conjunctivitis which cleared after 10 days of treatment with an unknown ointment.

Admission examination revealed a purulent conjunctivitis, a temperature of 100.8° F., and a cough. Penicillin injections, hot compresses, and sulfacetimide ointment were prescribed. The patient's temperature rose to 103° F. The mucosa of his mouth, pharynx, and lips became markedly swollen with a

vesicular eruption underlying a gray membrane. His palpebral conjunctiva was covered with a thick membrane that bled on removal. His submaxillary nodes were enlarged and he expectorated thick, bloody mucus. From 8 to 12 irislike lesions appeared on the palmar surface of each wrist. This was the first time that the ocular-mucous membrane syndrome was suspected.

Daily cultures from the conjunctival exudate at first only revealed *Staphylococcus albus*. On the fourth hospital day inclusion bodies were found in epithelial cells. These were best seen by using Giemsa stain. Pharyngeal smears showed gram-negative cocci and bacilli. On the sixth hospital day the patient began improving and within a week the temperature returned to normal. The conjunctivitis was persistent, however, and on the seventeenth hospital day aureomycin irrigations were begun in place of sulfacetimide ointment. On the thirty-seventh day, the treatment was changed to cortisone drops every 2 hours. The latter gave the most relief from soreness and injection and he was discharged improved after 44 days in the hospital.

Case 3. A 24-year-old man was admitted complaining of pain and discharge from his eyes and mouth and a rash on his upper and lower extremities. Seven days prior to admission he had been on a strenuous field maneuver. Two days later he developed a sore throat and "fever blisters" in his mouth. He noticed a discharge from his eyes and a rash on the following day. He had had an urticarial rash from penicillin 2 years prior to admission.

On admission his temperature was 99° F. A purulent conjunctivitis was present. There were vesicles and bullas on his buccal mucosa, lips, tongue, and pharynx. A gray pseudomembrane covered parts of his posterior pharynx. The skin on the dorsal aspects of his hands and forearms and the extensor surface of his legs was covered with discrete dark-red papules and raised multiform macules. There were some irislike lesions on his legs. His sedimentation rate was elevated. He was given 2 grams of aureomycin hydrochloride per day by mouth. Local treatment consisted only of hydrogen peroxide mouthwashes. Two days later the dosage of aureomycin was increased to 4 grams per day. The patient's course was febrile until the fourth day of therapy (99 to 101.8° F.). He then began to improve and by the eighth hospital day his mouth and skin lesions were clearing rapidly. The aureomycin dosage was lowered to 2 grams per day because of mild gastrointestinal symptoms. He was discharged on the seventeenth hospital day with only a few areas of fading pigmentation remaining on the dorsum of his hands.

DISCUSSION

There is reason to believe that these cases represent manifestations of the ocular-mucous membrane syndrome. The genitals were most severely involved in the first patient, whereas in the second the infection centered about the eyes. All 3 had characteristic irislike skin lesions. The second patient was treated unsuccessfully with sulfacetimide ointment, parenteral penicillin, and local aureomycin irrigations, but apparently responded best to topical cortisone. The first and third patients improved on aureomycin. It is interesting to note that the 3 cases occurred almost simultaneously at one Air Force Base in Alaska.

We believe that the initial treatment of choice is aureomycin hydrochloride given by mouth in doses of 4 grams per day, if tolerated. In the event that the progress of the condition is unfavorable, careful cortisone therapy, both topical (conjunctival) and intramuscular, should probably be attempted *(3)*. The finding of inclusion bodies in the conjunctival smear of case 2 is in keeping with other clinical reports *(4)*.

(4) Wammock, V. S.; Biederman, A. A.; and Jordan, R. S.: Erythema multiforme exudativum (Stevens-Johnson Syndrome); report on patient treated with pituitary adrenocorticotropic hormone. J. A. M. A. 147: 637-639, Oct. 13, 1951.

BOOK REVIEW

Gynecological and Obstetrical Pathology, by *Peter A. Herbut,* M. D., Professor of Pathology, Jefferson Medical College and Director of Clinical Laboratories, Jefferson Medical College Hospital, Philadelphia, Pa. 683 pages; illustrated. Lea & Febiger, Philadelphia, Pa., publishers, 1953. Price $12.50.

The author has produced a textbook which is exceptionally complete. Beginning with the regional anatomy fundamental to the understanding of disease processes, he systematically describes diseases from the standpoint of their pathology, diagnosis, and treatment. The text is replete with photographs showing the characteristic gross and microscopic pathology. It includes chapters by well-known authorities on physiology, cytology, Rh factor and blood groups, and the anemias of pregnancy. It is supplemented throughout by bibliographic references. Because of its conciseness and completeness, it would make an excellent addition to the library of the general practitioner as well as the specialist.—*Maj. W. C. Hernquist, USAF (MC)*

PLASTIC BAG FOR SHIPPING TISSUE SPECIMENS

ARTHUR STEER, *Lieutenant Colonel, MC, USA (1)*

FOR the past 15 months, the pathology department of this laboratory has been using plastic bags for shipping wet tissue specimens to the Armed Forces Institute of Pathology. More recently, bags were sent to some of the installations shipping such specimens to this laboratory. This method was found to be highly satisfactory.

Throughout the Far East Command, and especially in Korea, where the natives avidly appropriate tin containers, the usual difficulties encountered in obtaining satisfactory watertight containers are aggravated. In addition, such containers when filled with formaldehyde solution account for about 25 percent of the shipping weight. This is an important consideration because shipments are made by air. Sergeant Gerald Cassetta of the pathology department of this laboratory suggested the use of the plastic bags currently issued by the Chemical Corps as containers for gas masks. He tested the bags for reaction to formaldehyde solution, alcohol, and acetone, and for waterproof and airproof characteristics and found them to be satisfactory.

In the Far East Command these bags are obtained from the local Japanese market. Those currently used are made of polyvinyl chloride and measure 20 inches by 14 inches. They have a film thickness of 0.0043 inches and welded seams which can withstand a pressure of 6 pounds per inch. Other plastic bags of similar chemical composition should be equally satisfactory. Bags of similar composition of American manufacture but having the advantage of greater volume in that they are folded like ordinary grocery bags have been seen, but we have had no experience in the use of these bags.

In practice, plastic bags have many advantages over salvaged tin containers and more than repay the additional cost. Because there is no reaction between the liquid fixative and the container, corrosion and erosion with precipitation of metals in the tissues and drying out of specimens do not occur. The plastic bags can be easily stored, occupy little space, and are easily packed in wooden boxes for shipment. They can be made airtight by folding

(1) From the 406th Medical General Laboratory.

and tying the open end or by sealing the open end using an ordinary laundry iron at about 150° C. (fig. 1). Only a small amount of formaldehyde solution need be used if the tissue has previously been fixed because the contained air becomes saturated with for-

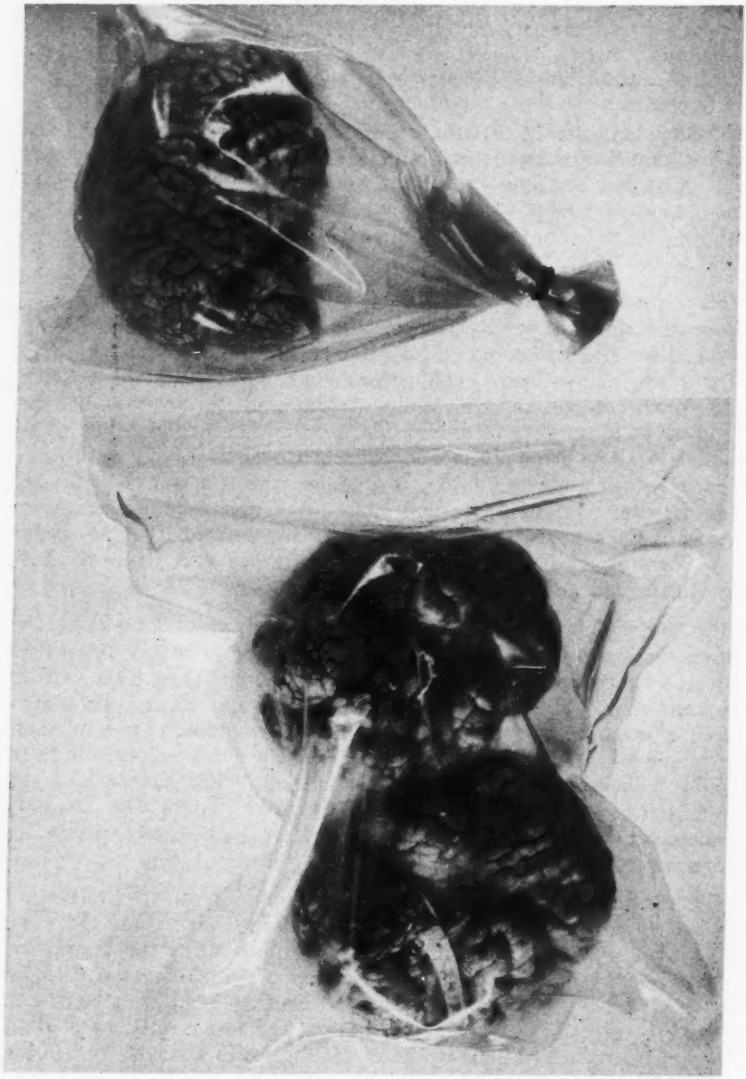

Figure 1. Two methods for sealing the plastic bags. A rubber band was used for tying the specimen at the top.

maldehyde solution and the tissues do not dry out. Thus there is a great saving in shipping weight. These plastic bags may be used repeatedly without deterioration. Because pieces of the plastic can be welded together, two or more bags can be joined for the shipment of large specimens such as extremities. Standard mason jars and large enamel or galvanized iron containers can be limited to use for primary fixation of tissues and the plastic bags used for storage and shipment. Undoubtedly other uses for these plastic bags will occur when they become available.

It should be noted that current postal regulations make no provisions for the use of plastic bags as containers for laboratory specimens. Inquiry of the Post Office Department *(2)* indicated that that Department would not object to the use of the bags of this type on a temporary basis subject to revocation in case of excessive damage provided that the plastic bags containing specimens are packed in strong, well-built containers which reduce the danger of puncturing to a minimum; that the bags are surrounded by sufficient absorbent material to absorb any formaldehyde solution which might escape and that the amount of formaldehyde solution in and around the specimen is limited to such amounts as are absolutely necessary and as can be readily absorbed by the absorbent material. Under such conditions tissue specimens could be admitted to the mails by parcel post.

These bags have been obtained through the co-operation of both the Chemical Corps and the medical supply officers in Japan, but they are not ordinarily available through normal medical supply channels.

(2) Personal communication from J. M. Redding, Assistant Postmaster General, to Colonel H. R. Gilmore, Jr., 29 Oct. 1952.

BOOK REVIEWS

Visual Anatomy: Thorax and Abdomen, by *Sydney M. Friedman,* M. D., Ph. D., Professor of Anatomy, University of British Columbia, Vancouver, Canada; Formerly, Associate Professor of Anatomy, McGill University, Montreal, Canada. 203 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1952. Price $10.50.

This book has been designed and illustrated in a most effective manner to accomplish the purpose for which it was published—to present briefly and forcefully a review of gross anatomy in a limited time. The excellent illustrations, all drawn by

the author, are placed on the right-hand page with the brief written supplement on the facing page. The author reverses the usual method of presenting anatomy by starting with the skeleton and working outward to the soft tissue structures. This is a simplified way for a quick but adequate review of major anatomic structures and their relationship to each other in the thorax and abdomen.—*Col. D. O. Lynn, MC, USA*

The Pharmacology of Anesthetic Drugs, A Syllabus for Students and Clinicians, by *John Adriani,* M. D., Director, Department of Anesthesiology, Charity Hospital, New Orleans, La.; Professor of Surgery, Tulane University School of Medicine; Associate Clinical Professor of Surgery, Louisiana State University School of Medicine. 3d edition, revised. 179 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1952. Price $9.50.

This new edition continues to be an authoritative treatise on the fundamentals of anesthetic drugs. Each drug or group of drugs is discussed under the following headings: historical data, source and chemical structure, pharmacology, and clinical application. The physiologic and pathologic changes occurring in the various organs and systems as a result of drugs used in anesthesia are outlined. Particularly outstanding are the sections on the physiology of spinal anesthesia and clinical considerations of anoxia.

The material is so condensed that it quickly fatigues the mind if many pages are read at one time. It should prove of value as a reference book for the clinician, the anesthesiologist, and for those preparing for examination (especially in the basic sciences). There are 11 pages of references conveniently arranged as to subject matter, 7 pages of definitions, as well as conversion tables, dosages, and qualitative tests. The book is well indexed.

Although 8 muscle-relaxing agents are discussed, the widely used succinyl choline was introduced after this book went to press. Two minor errors were noted. In the table on page 63, amylene hydrate is listed as a solvent for amylene hydrate rather than for avertin; and in the table on page 104, the action of ephedrine is listed as more prolonged than ephedrine rather than epinephrine.

Previous editions of this book have been standard texts for the anesthetist. This edition is also recommended without qualification.—*Lt. Col. R. R. Jones, MC, USA*

REGULAR ARMY APPOINTMENTS IN THE MEDICAL SERVICE CORPS

ROBERT L. BLACK, *Colonel, MSC, USA (1)*

THE recent publication of an Army Special Regulation (SR 605-25-10) concerning Regular Army appointment in the several corps of the Army Medical Service might at first glance give cause for concern to members of the Pharmaceutical profession. The regulation spells out required academic qualifications for each area of the Allied Science, Optometry, and Sanitary Engineer Sections of the Medical Service Corps, but the profession of pharmacy, being embraced in the Pharmacy, Supply, and Administration Section, is not given this individual qualification treatment.

In fact, the regulation sets as a basic qualification for all Medical Service Corps sections the baccalaureate degree, then specifically makes an exception for the Pharmacy, Supply, and Administration Section by saying, " * * * a waiver of the Baccalaureate Degree may be considered, provided applicant achieves a qualifying score upon the Educational Requirements Test DA PRT 2530, and evidences outstanding ability as demonstrated by his military record."

This provision for waiver overlooks that part of the regulation which states that to be eligible for Regular Army appointment, one must be a Reserve officer on active duty, and the fact that for a pharmacist to be a Reserve officer, he must be a graduate of an approved school of pharmacy (SR 140-105-6). An exception to this requirement is that when appointments are frozen as they currently are, a person can, if enlisted or inducted, apply for and obtain an appointment through Officers Candidate School. In this instance, appointment is the result of competitive participation and selection and is not based on academic training. He could also receive a field appointment from an enlisted status for outstanding service in a combat area.

So, for the pharmacy side of the Pharmacy, Supply, and Administration Section, no standard is relaxed in the slightest degree, even though the regulation at issue does not spell this out. Let's look at the rest of the Pharmacy, Supply, and Administration Section. This group contains over 65 percent of our 5,000 officers (including Reserve and National Guard) today. In

(1) Chief, Medical Service Corps.

this total there are over 500 graduates in pharmacy, of whom 100 are on full-time assignments as pharmacists. About the same number are on part-time duty as pharmacists and the rest, in all grades up to colonel, are on assignments commensurate with their civilian or military training. Because our Pharmacy ROTC programs and Army Reserve procurement produces more graduate pharmacists than the Army needs, as such, and because of their close association with the medical profession in general, the Army does not limit the number of pharmacists commissioned to its pharmaceutical needs, as we do in other scientific areas. It is well recognized that there are many types of Medical Service Corps assignment wherein a graduate in pharmacy may be successfully used beside that of compounding prescriptions. These include assignments (1) as assistant battalion surgeon, in combat units where he virtually replaces a medical officer, (2) as medical supply officer, (3) in research, and (4) in procurement of medical supplies, to name but a few.

Most of our Pharmacy, Supply, and Administration officers possess other than pharmaceutical training and background. It is only logical, therefore, that any policy concerning this Section must be all-inclusive. So far as the graduate pharmacist is concerned he profits by inclusion in this Section, because if pharmacy were set aside as a separate section of the Corps, like optometry, we would procure only enough pharmacists to fill our true pharmaceutical needs, and they would be greatly limited in so far as a military career is concerned. Viewed from the standpoint of the military system of promotion and responsibility, it appears that pharmacists might not only suffer by comparison but might lose some prestige as well. By this is meant that if responsibility for the professional and administrative management of an Army pharmacy can be vested in a lieutenant, his identical assignment 30 years later as a full colonel becomes somewhat ludicrous.

On the other hand, exception to baccalaureate degree for officers of the Pharmacy, Supply, and Administration Section (excepting pharmacists) is permitted for the following reason. In the past year, hundreds of officers (in several arms and services) have earned their commissions through the Officers Candidate School system, with subsequent assignment to combat units, and over 100 Medical Service Corps officers have gotten their commissions the hard way—battlefield appointments for outstanding leadership and valor in the face of the enemy in Korea. Many do, and many do not, have academic degrees. To tell these men that they are good enough to be shot at in Korea and not good enough for Regular Army status would require a philosophy to which few would subscribe. Our regulations, therefore, opened the door of opportunity for these men.

Relaxation of procurement standards for this purpose should not leave the impression of indiscriminate appointment. It is a highly selective process and the undergraduate applicant must possess *outstanding qualifications*.

Since World War II, the Army as a whole, and the Medical Service Corps, in particular, has concentrated on raising the academic level of its commissioned members. Of the Medical Service Corps officers on duty today, 68.4 percent have a college degree or the equivalent. The Army-wide average is 69.9 percent. Many of the Reserve officers now on duty were products of Officer Candidate Schools of World War II, commissioned in combat, or were accepted as Reserve officers at a time when the baccalaureate degree was not a criterion for appointment.

Except in times of emergency, when procurement standards are relaxed for the reasons stated above, the trend and objective of Medical Service Corps selection is from holders of a baccalaureate degree and in most allied science areas from holders of higher degrees.

BOOK REVIEWS

This Hospital Business of Ours, by *Raymond P. Sloan,* vice-president, Modern Hospital Publishing Company, Chicago; vice-president, the Alfred P. Sloan Foundation, Inc., New York, N. Y.; a trustee of Colby College, Waterville, Maine; member of the board of managers of the New York State Charities Aid Association and a member of numerous professional groups, including the American Hospital Association. 331 pages; illustrated. G. P. Putnam's Sons, New York, N. Y., publisher, 1952.

The author has had broad experience as a hospital trustee. This, combined with his ability as a publisher of hospital literature, adds to his fund of knowledge of the American hospital. Written as a guide to trustees and other hospital workers, this book covers the range of complexities of a modern hospital. He clearly delineates the obligations and responsibilities of a trustee, and the executive functions delegated to the hospital administrator who implements the policy and decisions of the governing board. Modern medical care, as we know it in the United States, has made a definite impact on our Nation. As medical science advances, the problems of caring for the patient increases. The hospital trustee must not only be capable of recognizing the advancement of medical science, but also keep

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abreast of this ever-changing field in order constructively to evaluate the performance of his hospital. His duties are extensive and he must carry them out intelligently and fairly. The author has set forth briefly and authoritatively this guide to greater hospital knowledge.

This volume is a fine contribution to hospitals, trustees, administrators, and hospital workers.

—*Col. M. L. Sheppeck, MC, USA*

The Foot, by *Norman C. Lake,* M. D., M. S., D. Sc. (Lond.), F. R. C. S. (Eng.), Senior Surgeon and Director of Surgical Division, Charing Cross Hospital; Emeritus Consulting Surgeon, Bolingbroke Hospital; Director of Studies, London Foot Hospital; Member of the Court of Examiners of the Royal College of Surgeons; Late Senior Examiner in Surgery, University of London and External Examiner in Surgery, Victoria University, Manchester. 4th edition. 466 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., publisher, 1952.

This fourth edition is the first revision since April 1943 and includes much new material representing recent developments during that period. The author's basic thesis throughout is that, in the mechanical sense, failure in structural adaption to new stresses is responsible for many of the foot troubles of modern life.

Other texts devoted to the foot alone emphasize details of treatment and only sketchily develop the rationale of the procedures recommended. The training of the orthopedic resident and others dealing with foot disorders also tends to the teaching of a routine of treatment and the application of appliances without adequate explanation of the reasons for the procedure. It is in respect to filling this deficiency in teaching that Dr. Lake's book is particularly recommended. In nearly every disorder discussed the applicable evolutionary, developmental, anatomic and mechanical stress factors are thoroughly developed so that the approach in treatment becomes clearly understood and logical. The book covers all disorders of the foot and can be criticized only in the respect that treatment is only briefly covered. For this reason it should be regarded as a most valuable complement to any of the other standard texts on the foot which are replete in details of therapeutic procedures. All students in any of the special fields concerned with the management of foot disorders should become familiar with this excellent text and those who have empirically treated feet for years can acquire from it a much better understanding of the reasons for their past successes and failures.—*Col. J. D. Blair, MC, USA*

AN ACCOUNTING

SPURGEON H. NEEL, Jr., *Lieutenant Colonel, MC, USA (1)*

THE Army is an instrument of national policy. It is only right that we periodically account to the nation regarding the resources with which we have been entrusted. In view of the national shortage of doctors, it is particularly important that the Army keep civilians informed as to the use we are making of the physicians provided for the care of military personnel and their dependents, both at home and overseas. Furthermore, the medical profession must be assured that our medical resources are being used as efficiently as possible. From time to time it is suggested or implied that the Army is misusing professional manpower. The basis for such criticisms is deserving of immediate and complete examination by those in positions of military responsibility.

Certain differences of opinion will probably always exist between civil and military medical authorities because the combat atmosphere is not fully appreciated by those who have never been in a combat zone nor cared for the men who fight and die there. Many members of the medical profession cannot understand why physicians are considered a special group and are "drafted" to supply national defense requirements. Actually, physicians have always enjoyed the privilege of being a special group. It is the very basis of the physician-patient relationship, which is so important in both civil and military medicine. It is a distinction that we have fought hard to gain and maintain through the centuries. We must never lose it. It was as a special group that many of us were deferred from military service during World War II while completing our education. It was as a special group that some medical students had their professional education financed by the Government. It is as a special group that we enjoy the admiration and trust of our patients and others around us. This special status entails responsibility. We must ensure that those for whom we are professionally and morally responsible receive the best in medical care, whether dressed in khaki or mufti. We should be willing to contribute full support to the preservation of this system.

Many junior officers, new in medicine and military service, express disapproval of their initial assignments to what we call "lower-level" medical service installations. They complain that

(1) The Medical Field Service School, Fort Sam Houston, Tex.

they are not permitted to practice the highly technical procedures which they witnessed during their recent training in large medical centers. They are seemingly unaware that they are comparing the "country practice" facet of military medicine with the medical center from whence they so recently emerged. It is only on leaving the service that they come to realize that Army medicine, whatever the level, compares favorably with the corresponding level of civil medicine. The significant number of physicians who return to the Army after a brief sojourn in civil life attest this fact. The Army provides the physician free opportunity to practice medicine in an unrestricted manner insofar as he is qualified and commensurate with the needs of the service. Medicine is where you find it. The clientele, whether military or civilian, determines to some degree the procedures indicated and the conditions under which medical care must be given.

On entering the military service, most physicians are first assigned to the Army's Medical Field Service School at Fort Sam Houston, Tex. There they undergo 8 weeks of intensive medico-military training. There is some misunderstanding as to why the physician must receive instruction concerning military matters with which he must deal during his entire period of service. Military medicine is a specialty and the effective military surgeon requires training in military matters because he must know his patients, their problems, and the environment in which he is expected to practice. The military surgeon must be taught how to live in the field and how to defend himself and protect his patients should the need arise. Any other course of action would not be fair to the physician and would be disastrous to the Army. The physician must be trained to assume the various command and staff responsibilities which accrue to him by virtue of his position as the final authority on all medical matters. To send a medical officer into an assignment for which he is unqualified, medically and military-wise, is just as dangerous as sending an unqualified surgeon into an operating suite. The basic difference is that not one but literally thousands may suffer. Many progressive medical schools, realizing the physician's relationship to his community and his collateral social and civil responsibilities, are adding appropriate courses to their curricula. The Army has long realized the importance of such collateral training for professional officers and has, for years, insured that medical officers would be competent to assume the vast responsibility that is theirs. The success of this principle is evident in the many medical advances achieved by military surgeons.

Assignment of medical officers to "nonmedical" duties is the target of frequent criticism. Let's look at the record. To free medical officers for purely clinical assignments, a healthy program of turning over to the Medical Service Corps as many duties

as possible was instituted during World War II and is being more and more widely implemented today. An overextension of this program would, however, result in loss of control by physicians and in their being relegated to purely technical duties under the supervision of laymen. Certain positions *must* continue to be filled by physicians if the medical profession is to retain control over the medical service of the Army. Even in civil life there are many doctors who do not carry "little black bags." Civilian medicine would be lost without them. Army medicine would be just as lost without a nucleus of well-qualified military surgeons to supervise special types of treatment, formulate workable medical plans, and represent their service to various tactical commanders. Regular medical officers who desire this sort of duty must be trained and given opportunity to gain experience in their chosen specialty. An effective command surgeon, familiar with the conditions of the battlefield and the requirements of his commander, can accomplish much in instituting an effective program of medical care. Acumen in military medicine is not inherent in doctors. It must be developed through years of training and experience. Without it, military medicine and the forces which it supports will become ineffective; national security will be imperiled.

Recently, it has been stated that medical officers are caused to move about the country and overseas too frequently. Such moving of physicians is, however, a direct result of the Army's effort to economize on professional personnel. War is not static. Means, including medical, must be shifted to meet situations as they occur. These situations may vary from a summer-training endeavor in the desert to the war in Korea. The only alternative would be to maintain at each installation or threatened locality a full medical staff sufficient to meet any peak load which might occur. It is far better to move medical officers rapidly to meet requirements than to keep many idle all over the world awaiting possible developments. The short rotation policy in Korea admittedly requires frequent moves by medical personnel. This policy was established in an effort to equalize the opportunity for combat duty among the members of the medical profession.

BOOK REVIEWS

Evolution and Human Destiny, by *Fred Kobler.* 120 pages. Philosophical Library, New York, N. Y., publishers, 1952. Price $2.75.

The author seems to have already exhausted all of his original ideas before he wrote this trivial little book. He flails about naively in a field he knows—or, at least, writes about—poorly. He pounces eagerly on many of the propositions necessary for his thesis, as though he is unaware that they were well covered in his high-school science book, e. g., "The structural complexity of a crystalline solid is certainly greater than that of an equivalent quantity of liquefied matter" and "Ordinary crystals should of course not be considered to be alive." Sometimes the reader is credited with little ability to think clearly as in the statement: "Initially of course living matter must have had the ability to synthesize its own structure from substances not derived from other life, since there was, by definition of 'initially,' not enough living matter available to provide raw materials for living forms." At other times too much is expected of the reader, e. g., "However the original concept of entropy as measuring the degree of randomness has in some of its applications been expanded to a point where it bears very little apparent relationship to its original definition in terms of available energy." If the reader is able to continue after this, he is likely to agree wholeheartedly with the author that "There is no question that the total knowledge effectively available to society today greatly exceeds that contained in any single human brain." He will then do well to turn elsewhere for his philosophy.—*Lt. Col. E. D. Palmer, MC, USA*

Acute Renal Failure, Including the Use of the Artificial Kidney, by *John T. MacLean,* M. D., F. R. C. S. (C), F. A. C. S., Assistant Urologist, Royal Victoria Hospital; Director of Urology, Queen Mary's Veterans Hospital; Department of Veterans Affairs; Demonstrator in Surgery, McGill University, Montreal, Canada. 114 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1952.

The author attempts to correlate briefly the current views on the cause, pathology, clinical course, and treatment of acute renal failure, with special emphasis on lower nephron nephrosis. A concise but excellent chapter on the artificial kidney is included, along with a few case histories. The treatment of lower nephron nephrosis with cortisone is briefly discussed. Adequate reference data are given at the end of each chapter.

—*Col. J. W. Schwartz, MC, USA*

AERO MEDICAL ASSOCIATION

Medical Officers to Speak at Los Angeles Meeting 11-13 May 1953

Officers of the medical services of the U. S. Navy, U. S. Air Force, and the Royal Canadian Air Force are among those appearing on the scientific program of the twenty-fourth annual meeting of the Aero Medical Association at the Biltmore Hotel in Los Angeles, 11, 12, and 13 May 1953. The presentations from the military services include the following:

Some Observations on Human Tolerance to Accelerative Stress. Part II: Preliminary Studies on Primates Subjected to 40 G—Lt. Comdr. E. L. Beckman, MC, USN; Lt. T. D. Duane, MC, USNR; Lt. J. E. Ziegler, MC, USN; and Hugh W. Hunter, Ph. D., Naval Air Development Center, Johnsville, Pa.

A New Device for Measuring the Effects of Continuous Positive Pressure Breathing on Lung Volumes and Ventilation—First Lt. A. L. L. Bell, USAF (MC), and Capt. James E. Wood, USAF (MC), Randolph Air Force Base, Tex.

The Operational Hazard of Microwave Radiation—Comdr. Sidney I. Brody, MC, USN, Washington, D. C.

The Effect of High Breathing Pressure on Cardiac Output With and Without Counter Pressure—Lt. Col. Clarence C. Cain, USAF; Maj. D. I. Mahoney, USAF (MC); and John A. Wood, Ph. D., Wright-Patterson Air Force Base, Ohio.

Fractured Vertebrae in Aircraft Accidents—Lt. (jg) John P. Charles, MSC, USNR, U. S. Naval Air Station, Norfolk, Va.

Fascination as Experienced by Naval Flight Students—Comdr. Brant Clark, MSC, USNR; Marjorie A. Nicholson, A. B.; and Capt. Aston Graybiel, MC, USN, U. S. Naval Air Station, Pensacola, Fla.

The Physiological Recognition of Strain Associated With Flying—Lt. Col. Thaddeus J. Domanski, USAF (MSC), and Lt. Col. James B. Nuttall, USAF (MC), Randolph Air Force Base, Tex.

A Plea for the Inclusion of the Cover Test for Heterophoria in Routine Flight Physical Examinations—Lt. T. D. Duane, MC, USNR, Naval Air Development Center, Johnsville, Pa.

Some Observations on Human Tolerance to Accelerative Stress. Part III: Human Studies of 15 Transverse G—Lt. T. D. Duane, MC, USNR; Lt. J. E. Ziegler, MC, USN; Hugh W. Hunter, Ph. D.; and Lt. Comdr. E. L. Beckman, MC, USN, Naval Air Development Center, Johnsville, Pa.

The Effect of Monocular Blind Areas on Visibility From Aircraft—Lt. Col. George O. Emerson, USAF (MC), Wright-Patterson Air Force Base, Ohio.

Study of Derangement of Function in Small Animals From Imposed Accelerative Stress Utilizing a Quick Freeze Technique—Comdr. Charles F. Gell, MC, USN, Naval Air Development Center, Johnsville, Pa.

Typical Impacts of Jet Aircraft Land Crashes—Lt. Comdr. Walton L. Jones, MC, USN, Washington, D. C.

Electrocardiography in the Selection of RCAF Aircrew—Wing Comdr. G. W. Manning, RCAF, New London, Canada.

Aerodynamic Effects on Cabin Altitudes—Flt. Lt. E. G. D. Maynard, RCAF, Toronto, Canada.

Aviation Safety and the Flight Surgeon—Lt. Col. James B. Nuttall, USAF (MC), Randolph Air Force Base, Tex.

The U. S. Air Force Noise and Vibration Control Program—Maj. Horace O. Parrack, USAF, Wright-Patterson Air Force Base, Ohio.

The Effects of Drugs upon Psychological Efficiency—Maj. Robert B. Payne, USAF (MSC), Randolph Air Force Base, Tex.

Aeromedical Problems of Aircraft Propulsion—Lt. Col. John E. Pickering, USAF, Randolph Air Force Base, Tex.

The Importance and Relation of Preventive Medicine to Aviation Medicine—Lt. Col. John Rizzolo, USAF (MC), Gunter Air Force Base, Ala.

Escape from Aircraft by Downward Ejection—Capt. Walter S. Rothwell, USAF (MC), and First Lt. Edward G. Sperry, USAF, Wright-Patterson Air Force Base, Ohio.

The Hemodynamic Response to Pressurization of the Lower Half of the Body in Man at 1 G—Capt. Owen L. Slaughter, USAF (MC), Naval Air Development Center, Johnsville, Pa.

Tolerance and Survival Limits for Linear Deceleration—Lt. Col. John P. Stapp, USAF (MC), and Capt. Paul G. Winquist, USAF (MC), Wright-Patterson Air Force Base, Ohio.

Dynamic Trials of Anti G Valves—Sq. Ldr. R. A. Stubbs, RCAF, Toronto, Canada.

Animal and Human Reactions to Rapid Tumbling—Capt. Harold S. Weiss, USAF; Capt. Robert E. Edelberg, USAF; and First Lt. Paul V. Charland, USAF, Wright-Patterson Air Force Base, Ohio.

Limitations of Cabin Pressurization—Wing Comdr. J. C. Wickett, RCAF, and Sq. Ldr. R. A. Stubbs, RCAF, Toronto, Canada.

RCAF Operation Calorie—Wing Comdr. J. C. Wickett, RCAF, and J. Q. Bliss, Toronto, Canada.

RCAF Para Rescue Organization—Sq. Ldr. J. R. W. Wynne, RCAF, Comox, Canada.

Some Observations on Human Tolerance to Accelerative Stress. Part IV: Human Studies of 15 Positive G—Lt. J. E. Ziegler, MC, USN; Lt. T. D. Duane, MC, USNR; Hugh W. Hunter, Ph. D.; and Lt. Comdr. E. L. Beckman, MC, USN, Naval Air Development Center, Johnsville, Pa.

Electroencephalographic Changes Produced by Acceleration—Lt. J. E. Ziegler, MC, USN, Naval Air Development Center, Johnsville, Pa.

SHADOW OF THE ANTRAL PORTION OF THE STOMACH SIMULATING A SOFT TISSUE TUMEFACTION[1]

PAUL A. PADEN, *Colonel, MC, USA*

HARRISON SHAFIRO, *First Lieutenant, MC, AUS*

THE antral portion of the stomach, especially when filled with food, may cause a confusing soft tissue shadow when a patient is examined in the supine position. Though this fact is apparently known to many experienced radiologists, we have been unable to find reference to it in standard textbooks or roentgenologic literature. Nathanson *(2)* described the shadow cast by the cardiac end of the stomach and stated that he had found no reference to it in the literature. Because of the paucity of published information on the subject and having seen such a shadow cause confusion at least 3 times in the past year, we present the following case report.

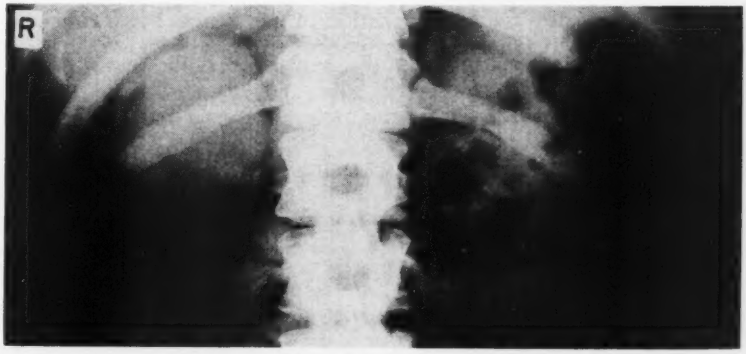

Figure 1. The soft tissue shadow in the right upper abdominal quadrant was seen when the lumbosacral spine was examined prior to physical therapy for chronic backache.

(1) Percy Jones Army Hospital, Battle Creek, Mich.

(2) Nathanson, L.: Shadow of cardiac end of stomach simulating soft tissue tumefaction in supine position. Radiology 32: 473-475, Apr. 1939.

CASE REPORT

A young medical officer was well except for a chronic backache. The officer in charge of the physical therapy section requested roentgenograms of the lumbosacral spine prior to physical therapy. The soft tissue shadow in the right upper abdominal quadrant (fig. 1) was a cause of concern to him and to the patient. Though we assured the patient that the shadow was in all

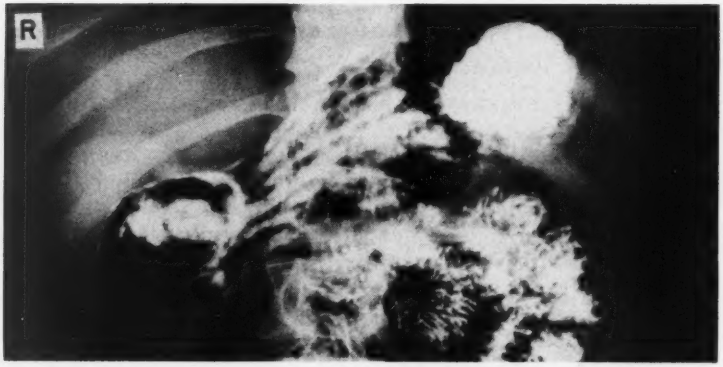

Figure 2. The stomach, gallbladder, and colon contain contrast media. The antral portion of the stomach is seen at the site of the shadow and corresponds to it in size and shape.

likelihood cast by the antral portion of the stomach, he requested a detailed study for his own peace of mind. Figure 2 shows conclusively that the shadow was cast by the antral portion of the stomach. Intravenous urography had already shown a normal urinary tract.

BOOK REVIEWS

A Vitamin Digest, by *Guy W. Clark,* Technical Director, Lederle Laboratories Division, American Cyanamid Company, Pearl River, N. Y. 254 pages. Charles C Thomas, Publisher, Springfield, Ill., 1953. Price $6.50.

This is an excellent presentation of the story of vitamins. Although it is not a reference book, there is an extensive bibliography at the end of each chapter. The author includes a great deal of controversial material. To my mind, this is an advantage and serves to complete the picture as the author sees it. For anyone who has kept abreast of the literature on the subject, it would be a waste of time to read this book, but the busy practitioner will profit greatly by using it to review the subject. The subject matter is presented in an interesting manner, starting with the early history and describing developments up to about 1950.

—Lt. Col. M. E. Groover, Jr., USAF (MC)

Regeneration and Wound-Healing, by *A. E. Needham,* M. A., B. Sc., University Demonstrator in Zoology, University of Oxford. Methuen's Monographs on Biological Subjects. 152 pages; illustrated. John Wiley & Sons, Inc., New York, N. Y., publishers, 1952. Price $1.75.

This little book is a brief, but detailed and critical, introduction to selected international literature on the known morphologic and biochemical aspects of wound-healing and regeneration with emphasis on studies of invertebrates. It also points out features needing further study. The volume includes some studies of vertebrates but only incidentally includes mammalian tissues. It embraces over 500 references dating from the eighteenth century up to and including 1951. Although it should be of great value to the zoologist, it is of no practical value to the practicing physician.—*Col. R. P. Johnson, MC, USA*

Therapeutic Use of Pools and Tanks, by *Charles L. Lowman,* M. D., D. Sc., F. A. C. S., F. A. A. P. E., Director of Education and Rehabilitation, Orthopaedic Hospital, Los Angeles, Calif., and *Susan G. Roen,* Director of Physical Therapy, Orthopaedic Hospital, Los Angeles, Calif. 90 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publishers, 1952.

This long awaited manual fills a distinct need in the field of aquatic reconditioning and underwater exercise, an important mode of treatment in the field of muscle re-education and physical

rehabilitation for the severely disabled patient. The senior author's original manuscript and publication on hydrogymnastics represents a pioneer effort in the development of these technics, but reconsideration, in keeping with new developments in this field has long been a distinct need. A section of the book dealing with the use of hypertonic saline baths for draining wounds and other orthopedic conditions is particularly valuable.

The book contains 9 chapters dealing with the history of hydrogymnastics; construction, equipment, and maintenance of pools and tanks; administration, and training of pool directors and staff personnel; assistive devices for the paralytic patient; and the technics of various underwater and walking exercises applied in the treatment program. An appendix includes detailed construction plans and specifications for the smallest-sized treatment pool which can be easily and economically constructed, thus meeting the needs for this type of treatment in medium-sized general hospitals. This volume has been brought up to date and rewritten, incorporating important additions, changes of concepts, and new uses of hydrogymnastics, illustrated with a series of line drawings which clarify many points on the use of special equipment and technics.

An omission of minor importance is the lack of statistical information, scheduling, and times of individual treatment procedures and the length of time patients undergo a treatment program. More detailed information regarding the maintenance of equipment and pools, with observations on water temperatures and proper control of other environmental factors, would be helpful. This book should be useful to the physician and therapist interested in this phase of medical treatment and rehabilitation. The description and proper use of equipment is emphasized and thoroughly covered from the standpoint of essential needs for this type of therapy.

—*Lt. Col. J. H. Kuitert, MC, USA*

Standard Values in Blood, Being the First Fascicle of a Handbook of Biological Data, edited by *Errett C. Albritton,* A. B., M. D., Fry Professor of Physiology, George Washington University. 199 pages. Prepared under the Direction of the *Committee on the Handbook of Biological Data, American Institute of Biological Sciences, The National Research Council.* W. B. Saunders Co., Philadelphia, Pa., 1952.

The purpose of this book was to compile established basic data on the composition and reaction of blood in a compact and authoritative volume. The compendium describes the physical properties of blood, coagulation, blood groups, the formed elements of blood and bone marrow, chemical composition, and several other related subjects. An unusual amount of information

is presented clearly in tabular form. In testimony of its authoritativeness, over 600 contributors and reviewers were consulted in selecting and evaluating the data presented. Although much of the material appears to be esoteric to one not familiar with all of the many specialties covered, this does not detract from its inherent value as an encyclopedic work. One of the most valuable attributes of the book is the extensive bibliography which contains one or more references for each of the presented values. It is an excellent reference book that should be useful to those engaged in clinical medicine as well as biological research.—*Commander E. P. Cronkite, MC, USN*

This Is Your World, A book for the orientation of professional workers to the emotional problems of the chronically ill patient; tuberculosis and the individual. Written and Illustrated by *Harry A. Wilmer,* M. D., Ph. D., in Path., Consultant in Psychiatry, San Mateo County Tuberculosis Sanatorium; Instructor in Medicine (Neuropsychiatry), Stanford University, San Francisco, Calif.; Consultant to Division of Chronic Disease and Tuberculosis, United States Public Health Service, Washington, D. C. Foreword by *Adelaide McF. Johnson,* M. D., Ph. D., Consultant in Psychiatry, Mayo Clinic, Rochester, Minn.; Associate Professor of Psychiatry, University of Minnesota; Member, Chicago Psychoanalytic Institute. 165 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1952. Price $5.50.

This book is the outgrowth of a group therapy experience in a tuberculosis sanatorium and illustrates practical application. The author comments on the literature, emphasizing that most studies have to do with behavior of the tubercle bacillus, tissue pathology, immunology, and resistance, but neglects the behavior of the patient. The facts that discharge against medical advice is common, is to be counted a failure in treatment, and that technics for treating emotional unrest are not common knowledge are emphasized. The book is regarded by the author as "the expression of a few therapeutic word tools found to be of practical value to one psychiatrist."

The author's drawings, symbolic of the mental status of the tuberculous patient, are thought-provoking. The ballad, "This Is Your World," presented as a dialogue between doctor and patient covering the emotional experiences lived by the patient throughout hospitalization is significantly divided into 3 parts: "The Newcomer," "The Wantaleaver," and "The Old Timer." In 16 other sections, dialogues representing childhood conflicts are given. These are also available on records and are said to be useful in group treatment sessions. These dialogues are incomplete in that they have no ending, and are to be filled in by the group, somewhat in the manner of a sentence completion test. The dialogues cover feelings of rage, regressions, revenge,

frustration, gratification, fantasy of wealth, rivalry, helping the handicapped, questions of honesty, aggression, dependence, displaced hostility, the unwitting influence of one person on another, special privilege, faith, and an arbitrary decision. The concluding chapter entitled "Science and Psychiatry" is a penetrating critique of the scientific method as well as of sloppy thinking, uncontrolled experiment, and poor semantics.

All in all, this is a fascinating volume and most readable. The ballad will find ready response in all who have dealt with tuberculous patients. The attitudes expressed and implied are as important as the presentation of technics. The title "This Is Your World" applying to the patient could easily have been "This Is A Way" with reference to the doctor. Although it should be basic reading specifically for all who care for tuberculous patients, it is well worth reading by all who are interested in group therapy or in treatment of any patients drawn together into a unit by their disease.—*Col. D. B. Petersen, MC, USA*

Analgesia and Anesthesia in Obstetrics, by *J. P. Greenhill,* M. D., Professor of Gynecology, Cook County Graduate School of Medicine; Attending Gynecologist, Cook County Hospital; Attending Obstetrician and Gynecologist, Michael Reese Hospital; Associate Staff, Chicago Lying-in Hospital, Chicago, Ill. American Lecture Series, Publication No. 159, A Monograph in American Lectures in Gynecology and Obstetrics. Edited by *E. C. Hamblen,* M. D., F. A. C. S., Professor of Endocrinology, Associate Professor of Obstetrics and Gynecology, Duke University School of Medicine; Chief of the Division of Endocrinology and Endocrinologist, Duke Hospital, Durham, N. C. 85 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1952. Price $2.75.

This book is a synopsis of the different methods and types of agents that have been used in obstetrics. In general, the subject material is discussed in 3 categories: (1) agents and hypnotics used in the first and second stages of labor; (2) methods used for conducting the second and third stages of labor; and (3) agents and technics used in all other obstetrical and gynecologic procedures. The book is bound in a flexible cover. The print is legible, and each subject is treated in a paragraph. The discussion of physiologic and pathophysiologic problems in respiration and circulation are not dealt with under each heading. The reader is given a description of the various agents, the effect on maternal, uterine, and fetal physiology. This book is primarily for those who have had little experience with analgesia and anesthesia in obstetrics, and is an outline rather than an original work.—*Lt. R. W. Lykins, MC, USN*

Dermatology, Essentials of Diagnosis and Treatment, by *Marion B. Sulzberger,* M. D., Professor and Chairman, Department of Dermatology and Syphilology, New York University Post-Graduate Medical School; Director of Dermatology and Syphilology, Skin and Cancer Unit and University Hospital, New York University-Bellevue Medical Center; Captain, MC, USNR, and Consultant Dermatologist to the Bureau of Medicine and Surgery, Department of the Navy; and *Jack Wolf,* M. D., Associate Professor of Clinical Dermatology and Syphilology, New York University Post-Graduate Medical School; Attending Dermatologist and Syphilologist, Skin and Cancer Unit and University Hospital, New York University-Bellevue Medical Center. 592 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., publishers, 1952. Price $10.

This is the fourth edition of the text that has previously been published under the title of "Dermatologic Therapy." It is well illustrated and packs a surprising amount of useful information and experienced therapeutic advice. The addition of a series of colored plates is welcome. This publication has become a little too technical for the general practitioner, yet it contains a tremendous amount of practical and useful information for the general practitioner, the internist, and the medical officer on ships and in isolated commands, as well as the dermatologist. Although it is primarily a guide to treatment, by the use of various tables of comparative signs and symptoms and the listing of various differential diagnoses, a great amount of information relative to diagnosis is made available.

New features include a discussion of (1) the use of ACTH and cortisone for various dermatoses, (2) atabrine therapy for lupus erythematosus, and (3) modern concepts of syphilis and all phases of its treatment.

A short chapter on technics of tests useful to the dermatologist should be incorporated. Such tests could include: (1) clinical demonstration of iron in the skin, (2) creatinine test in dermatomyositis, (3) tests for urinary porphyria, (4) urinary test for calcium before and during vitamin D_2 therapy, (5) Congo-red dye injections in amyloid deposits, (6) newer stains for fungi, and (7) the demonstration of virus inclusion bodies. In the chapter dealing with sulfonamides, mention should have been made of the newer drugs such as elkosin which may be given in relatively large doses without the crystallization in the kidneys characteristic of the older sulfonamides.

The authors recommend ACTH and cortisone in the treatment of psoriasis. A note of caution should be entered because some patients develop untoward reactions to this form of treatment. Although these "miracle" drugs may be tried, this should be done in a hospital under daily observation by the prescribing physician.

On page 73, the use of podophyllin in treatment of condyloma acuminatum is discussed. The danger of podophyllin in its action on contiguous tissues, and protection of adjoining normal surfaces to prevent pain and edema, should be mentioned. The physician may be embarrassed when a dorsal slit becomes necessary because of the extreme reaction of the prepuce when podophyllin is used on a rosette of condylomata about the corona and coronal sulcus. Furthermore, podophyllin is of little use in the treatment of keratotic condyloma. On page 361, the Davis method of administration of iron cacodylate and coagulen is mentioned. The dosage and frequency of administration should have been stated. More cross references would have enhanced the value of the book. Although it is not feasible to repeat the full directions each time a medication is recommended, such a reference to the appropriate page number where it is adequately described would be desirable, or an appropriate page designation in the index would be handy.

This book is not recommended as a full text on dermatology. It is recommended for its completeness relative to therapy and is a useful book as an adjunct to one of the larger texts.

—*Capt. W. N. New, MC, USN*

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